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Handbook of Waterfowl Behavior: Tribe Tadornini (Sheldgeese and Shelducks)

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The Subfamily Anatinae

The last, and by far the largest, subfamily of waterfowl includes the sheldgeese, the shelducks, and the true ducks. The subfamily differs in several respects from the preceding groups. Nearly all the species possess tarsi which have a scutellated rather than reticulated pattern in front, most species have tracheae and syrinxes which differ in the two sexes, and most (possibly all) species undergo two molts of the body feathers annually. These last two features are correlated with the length and strength of the pair bond, as is also the fact that there tends to be a sexual dimorphism in adult plumages. Most and possibly all species mature in their first or second year of life.

TRIBE TADORNINI (SHELDGEESE AND SHELDUCKS)

The first tribe of the Anatinae includes the 16 species of sheldgeese and shelducks ("*Lophonetta*" and *Tachyeres* are here excluded from the tribe) which provide such a smooth transition from the true geese to the true ducks that it is difficult to establish a dividing line between the two groups. I believe that the line is best placed between *Cereopsis* on the anserine side and *Cyanochen* on the anatine side. *Cyanochen* is clearly a sheldgoose, but the plumages and voices of the sexes are practically alike, as are also their displays. *Cyanochen* and the other Tadornini are characterized by a downy plumage that is strongly marked with dark and white, by a tendency to nest in cavities, and by the fact that they forage either by grazing (sheld-

geese) or by grazing and dabbling (shelducks). Metallic plumage coloration is encountered in this group, as are vermiculated feather patterns; both are typical of most of the rest of the Anatinae. Pair bonds appear to be fairly strong in sheldgeese, but less strong in shelducks. Unlike that of the true geese, pair-forming, or courtship, behavior is conspicuous, and in this group may be observed the basic pair-forming mechanism which is to be found, in varying degrees of refinement, in all other tribes of Anatinae. Simply stated, this is the tendency of the female to Incite (Lorenz, 1951-1953) males to attack other males or females, and to "select" her mate on the basis of the male's reaction to this Inciting. Here sexual selection enters the picture, and the complex male plumage patterns and male courtship-behavior patterns can be understood and interpreted only by reference to the principle of sexual selection.

In his highly significant studies on the behavior of the Anatinae, Lorenz (1941; 1951-1953) emphasized this basic principle of pair formation. He states that female Inciting occurs in a homologous manner, although in outwardly different fashions, throughout most of the true ducks. The following quotation clearly states his (and my) views: "I am convinced that it [Inciting] represents a real 'phylogenetic order' for, beyond all doubt, the forms of Inciting as they are found in Casarcinae (= Tadornini) and indeed, to a certain extent in Anserinae, represent the original form of the [Inciting] movement. Until one recognizes this one cannot understand at all the ceremonies of the Anatinae, which, in their significance, are strongly modified." Although Lorenz uses "Anatinae" here in the restricted (Anatini) sense, his statement remains true if the more inclusive, Delacourian usage of the term is accepted. The evolutionary origin of Inciting is obscure and must remain a matter for speculation, but it may have derived from the Triumph Ceremonies typical of the Anserinae.

In the Tadornini, female Inciting is almost completely functional, and the typical male response to Inciting is immediately to threaten, and often to attack, the indicated opponent. In its more primitive form, as found in *Cyanochen* and *Chloëphaga*, Inciting consists primarily of calls, and if visual signals do accompany these calls, they do not have a marked directional orientation. In its more advanced forms (*Alopochen* and *Tadorna*) Inciting clearly has a directional basis, and the form of the Inciting movements is to some degree de-

pendent upon the position of the object of the Inciting. (Later it will be seen that in the more advanced and highly specialized tribes this directional tendency is often secondarily lost, although the "pointing" movements may remain a part of these highly ritualized displays.)

The reaction of the males to Inciting is all-important to their success in obtaining a mate. In motivational terms, they are in conflict between attacking the indicated enemy, escaping from this enemy, and reacting sexually toward the female (Moynihan, 1955). Presumably as a result of these conflicting tendencies, displays have evolved which exhibit varying degrees of compromise among the various tendencies. This aspect of displays will not be considered here, but further discussion on the origin, function, and evolution of displays may be found in the papers of Moynihan (1955) and Hinde (1959), to which the reader is referred.

Abyssinian Blue-winged Goose (*Cyanochen cyanopterus*)

As stated above, I believe that the blue-winged goose is the most generalized species of the present tribe. Indications of this are the absence of plumage dimorphism in the two sexes and the similarity in the behavior and voices of males and females. Both sexes have high-pitched, almost whistling voices, and the female seems to lack the low guttural calls of most anatine females. The male trachea has a fairly small, rounded, and bony bulla. The downy young exhibit the typical contrasting sheldgoose pattern. The adult plumage is mostly grayish, but the secondary feathers have a slight metallic-green sheen. Unlike those of nearly all the other species of the tribe, the upper-wing coverts are not white but pale blue. The lesser coverts, however, and also the underwing linings, are white. The species is restricted to northeastern Africa, and is sympatric with the Egyptian goose, with which it has produced fertile hybrids in captivity. It has also hybridized with the Orinoco goose and two species of *Chloëphaga*.

General behavior. The most characteristic aspect of the general behavior of blue-winged goose is the way in which the bird holds its head back on its shoulders when at rest or while walking undisturbed; a similar posture is sometimes adopted by the Andean goose. The species is a bird of the highlands, and it walks and runs well. McKinney (1953) observed lateral Head-shaking and, possibly, Chin-lifting as preflight movements.

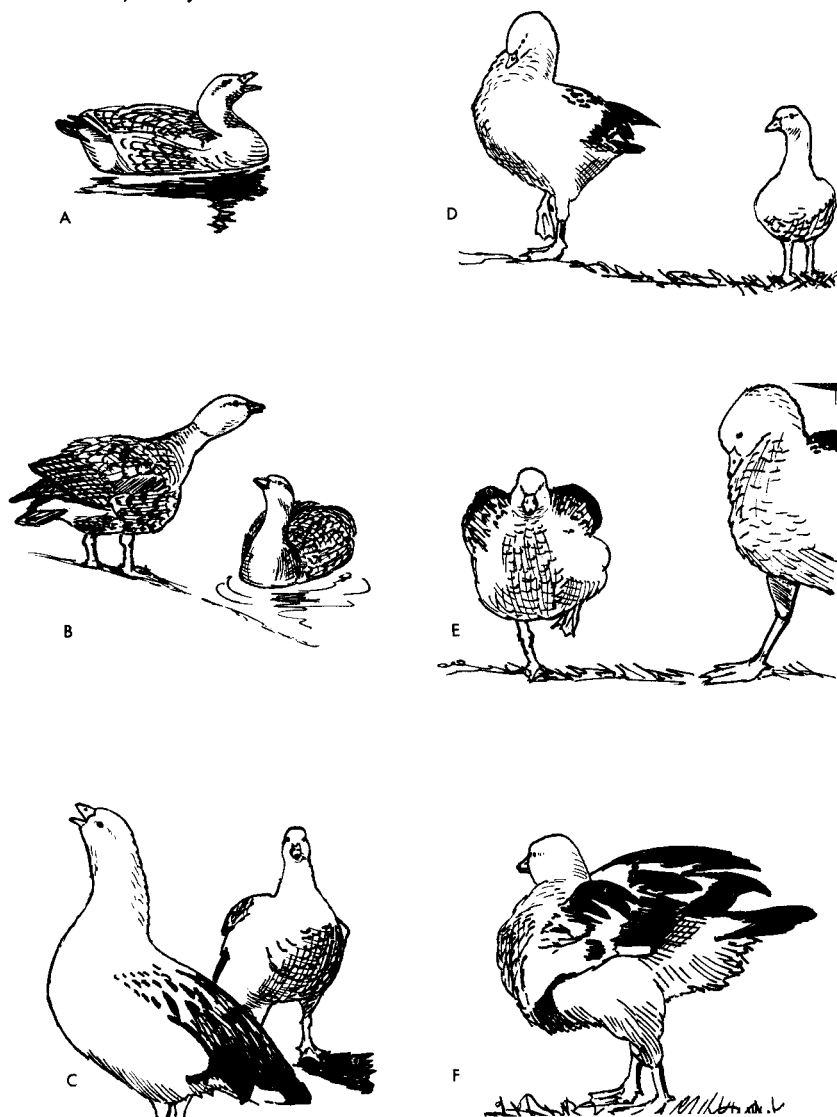


Figure 19. Blue-winged Goose, Andean Goose

- A. Blue-winged goose male in threat posture, gaping but not calling.
- B. Blue-winged goose pair (*male on left*) calling mutually after an aggressive encounter, apparently a form of Triumph Ceremony.
- C. Male Andean goose (*left*) uttering aggressive whistling note.
- D. Male Andean goose (*left*) performing Puffing display.
- E. Female Andean goose (*left*) Inciting while male performs Puffing display.
- F. Female Andean goose Inciting.

Agonistic (attack-escape) behavior. I have observed little aggressive behavior in females, and nothing except repeated calling which I could attribute to Inciting. Males frequently threaten smaller waterfowl, swimming or standing very erect, with neck outstretched and head held high, but with the wings closed and inconspicuous (Fig. 19A). After making such a threat, a male runs back to his mate, rapidly whistling *wi-wi-wi-wi-wi-wi*. . . . She responds in the same manner, and the two stand calling with their necks diagonally outstretched, heads close together, and bills almost touching, in what is clearly a kind of Triumph Ceremony (Fig. 19B). I have called this posture and call the Wi-wi call, and obvious homologies can be found in the other sheldgeese, but only among males.

Sexual behavior. I have not observed copulatory behavior or been able to learn anything about it.

SOUTH AMERICAN SHELDGEESE

Five species of sheldgeese of the genus *Chloëphaga* form a closely knit group of great evolutionary and behavioral interest. They are all generally very similar and share the common characteristics of having white upper-wing coverts, a metallic-colored speculum formed by the secondary coverts (rather than by the secondaries as in other anatines), and white secondaries. In all species the male voice is a whistle and that of the female a low, ducklike cackle. All have short, high bills adapted for grazing, and all species are semiterrestrial. In three species the sexes differ scarcely if at all in their adult plumage, whereas in the other two species the sexes could hardly be more different. Although the explanation for this is still by no means clear, it does appear that the males of the species which exhibit marked sexual dimorphism in plumage (Magellan and kelp geese) do not perform such elaborate displays as the males of species in which the sexes have similar plumage patterns.

Andean Goose (*Chloëphaga melanoptera*)

On at least two counts the Andean goose appears to be rather closely related to the blue-winged goose. The yellow facial markings and cheek patches of the downy young of both species indicate a close affinity, and the general posture and shape of the adults are also similar in the two species, although this may reflect nothing more than that both species dwell for the most part in the uplands.

The adult plumage pattern of the Andean goose is typical of *Chloephaga*, and is a contrasting black and white in both sexes. The Andean goose is more northerly ranging and mountain-inhabiting than are the other species of this genus, and it is apparently not sympatric with any of them. Hybrids have been obtained in captivity with the Magellan goose and the Egyptian goose.

General behavior. Although the sexes of the Andean goose are marked exactly alike, there is no difficulty in determining the sex of an adult bird. Besides being larger, the male is almost continually calling and displaying before the female. I have observed mutual nibbling of the cheeks between paired birds (Fig. 20D), but I have not recorded any preflight movements.

Agonistic and sexual behavior: female. This is the first species so far dealt with which clearly exhibits a true Inciting behavior. While Inciting, the female calls rapidly and strongly a hoarse *gack-gack-gack* . . . and shakes her tail from side to side and walks with high steps, holding her folded wings and hindquarters in a characteristic high position (Fig. 19E, F). There is no directional orientation of the head toward the object of the Inciting; rather, the female tends to walk away from the opponent and around her mate. She holds her head high, never lowering it as the females of some of the following species occasionally do.

Agonistic and sexual behavior: male. It is difficult to distinguish between agonistic and sexual behavior in this and the following species because, as I mentioned earlier, the male displays combine elements of attack, escape, and sexual tendencies. The primarily agonistic displays of the male Andean goose include a number of only slightly modified comfort movements. These are ritualized versions of the general shake (McKinney, 1953), wing-flapping (Fig. 20A, B), and head-rolling (Fig. 20C). Of these, the last is most striking, being assumed very quickly from a position of outstretched head and neck, and lasting only a fraction of a second. The rolling component is but slightly indicated in the display, and it was obvious only after I had observed unmistakable head-rolling as an apparent displacement activity* in a disturbed male Magellan goose. The other major agonistic display is the Wi-wi call, a rapidly repeated one-syllable whistling

* As used here, "displacement activity" simply means "inappropriate" behavior which has apparently not been evolved (ritualized) into a display (behavior having signal function).



Figure 20. Andean Goose, Magellan Goose

- A. Male Andean goose performing Wing-flapping in threat situation.
- B. Aggressive Wing-flapping, front view.
- C. Male Andean goose performing Head-rolling in threat situation.
- D. Male Andean goose nibbling the head region of mate.
- E. Magellan goose pair. Female Inciting while male utters whistling notes.
- F. Attack by male Magellan goose. Note slightly raised wings with white upper coverts and bony protuberance at wrist.

note uttered with head and neck diagonally outstretched (Fig. 19C), which is performed in much the same way as it is by the blue-winged goose. In this case, however, the display is performed only by the male and appears to function as a threat. Head-rolling often occurs during this display.

I believe that the primary sexually motivated display is one which I have termed Puffing. This display often occurs while the the female is Inciting, or when the male returns to the female after a threat or an attack. The male walks in a very "haughty," rather erect posture, with his body feathers puffed out and his bill resting on his expanded chest (Fig. 19D, E). The folded wings are somewhat lifted to reveal the speculum, the tail is shaken frequently, and a loud, rather flatulent *humm-pah* is repeatedly uttered. This display appears to function both in courtship and Triumph Ceremony situations.

Copulatory behavior. I have not observed copulation in this species, but no doubt it is very much like that in other species of sheldgeese and occurs while the birds are standing in shallow water. Mr. Tom Spence (pers. comm.) informs me that the postcopulatory display consists, as it typically does in both sheldgeese and shelducks (see Fig. 24D), of Wing-lifting by one or both birds.

Magellan Goose (*Chloëphaga picta*)

Sexual dimorphism in plumage and foot coloration is strongly evident in the Magellan goose, as the male is rather similar in plumage to the Andean goose, and the female approaches the female kelp goose in coloration. The downy young are similar to those of the Andean goose, but lack the yellow tinge on the head feathers. The trachea of the male has a very large syringeal bulla, which is rounded and rather thinly ossified, and which, as with almost all Anatinae, is located on the left side of the syrinx at the junction of the bronchi. The Magellan goose is sympatric with ashy-headed and ruddy-headed geese in southern Argentina and Chile, and with the kelp goose in the Falkland Islands. There are two subspecies, the Falkland Island race being somewhat larger than the mainland form. In captivity the species has hybridized with Andean, ruddy-headed, and Egyptian geese.

General behavior. Like the Andean goose, the Magellan goose is very aggressive; but unlike that species, which displays almost year-around, the Magellan goose engages in intense display only dur-

ing late winter and spring. I have not observed any mutual nibbling, nor have I seen any preflight movements. The birds tend to remain in pairs all year, and presumably the pairs are relatively permanent. Delacour (1954) states that this and the other species of sheldgeese, in common with shelducks, have two molts of body feathers each year, but I have been unable to confirm this statement.

Agonistic and sexual behavior: female. Inciting in this species is similar to that of the Andean goose, but with some interesting differences. The Inciting call is essentially the same, but the tail is not shaken during the display and the walk is not so exaggerated as in that species. The hindquarters, but not the wings, are distinctly raised during Inciting (Fig. 20E). The female walks or runs toward her mate with head erect during Inciting, occasionally making rapid and rather rudimentary Bowing movements with the head which resemble intention movements to graze. Much more intensified forms of these movements are found in the ashy-headed and ruddy-headed geese.

Agonistic and sexual behavior: male. Unlike the Andean goose, the Magellan goose does not appear to have ritualized the general shake, wing-flapping, and head-rolling into displays; but these movements occur at times as apparent displacement activities. The primary male response to Inciting is the aggressive Wi-wi call, uttered with body erect, neck outstretched, and with the wings held against the body (Fig. 20E). The male faces his opponent during this display, standing more and more erect at higher intensities. One who is familiar with Andean geese constantly expects this display to be replaced by Puffing, but in my experience this has never happened. Occasionally, short and rather inconspicuous Bowing movements may be performed as momentary interruptions to the aggressive calling. The Wi-wi call may be elicited throughout the year even in the absence of an Inciting female. When attacking another bird, the male runs rapidly over the ground with his head low and with his folded wings slightly spread, thus exposing his immaculate white upper-coverts (Fig. 20F).

Copulatory behavior. I have observed copulation only once in this species, and it occurred as the pair stood in shallow water. For about ten seconds both birds made repeated and essentially synchronous Head-dipping movements—which very clearly were derived from bathing movements—before the male mounted. As tread-

ing was completed, the female, and probably also the male, called as the male slipped to the ground and slightly raised the wing on the side opposite the female. Mr. Tom Spence (pers. comm.) has also observed postcopulatory Wing-lifting in this species.

Kelp Goose (*Chloëphaga hybrida*)

Judging from my very limited experience with a few Patagonian kelp geese observed at the Philadelphia zoo, this species appears to be somewhat intermediate between the Magellan goose and the two following species. The downy young are essentially all-white, only faintly exhibiting the typical sheldgoose patterning, and the adults present an even greater degree of sexual dimorphism than does the Magellan goose. Aside from the swans, the adult male kelp goose is the only all-white waterfowl—a fact of particular interest because even the secondary coverts are white rather than metallic-colored. Females are very dark, but do exhibit the metallic speculum. Although the kelp goose is generally sympatric with the other non-montane forms of *Chloëphaga*, its special ecological niche among the kelp beds of the rocky coasts probably reduces interspecific contacts. No hybrids involving this species are known. The tracheal bulla of the male closely resembles that of the ashy-headed goose (J. V. Beer, pers. comm.).

Behavior. Cawkell and Hamilton (1961) mention, regarding the Falkland Island race of kelp goose, that during display the male “flung his head back and then forward keeping the beak parallel with the ground whilst the female lowered her head toward the gander and raised her tail.” This description fits my few observations fairly well. I observed a definite mutual Bowing display, very similar to those of ashy-headed and ruddy-headed geese (see Fig. 21). During this the male whistled a repeated *wi-wi-wi* . . . while the female uttered a loud cackle as she alternated her erect and lowered-head postures. I did not observe the tail-raising mentioned by Cawkell and Hamilton, which suggests an Inciting similar to that of the Magellan goose. I know of no other information regarding this species.

Ashy-headed Goose (*Chloëphaga poliocephala*)

The ashy-headed goose is smaller than the birds of the preceding species, and only slightly larger than the ruddy-headed goose. As in that species, the sexes are almost identical in appearance. Like both

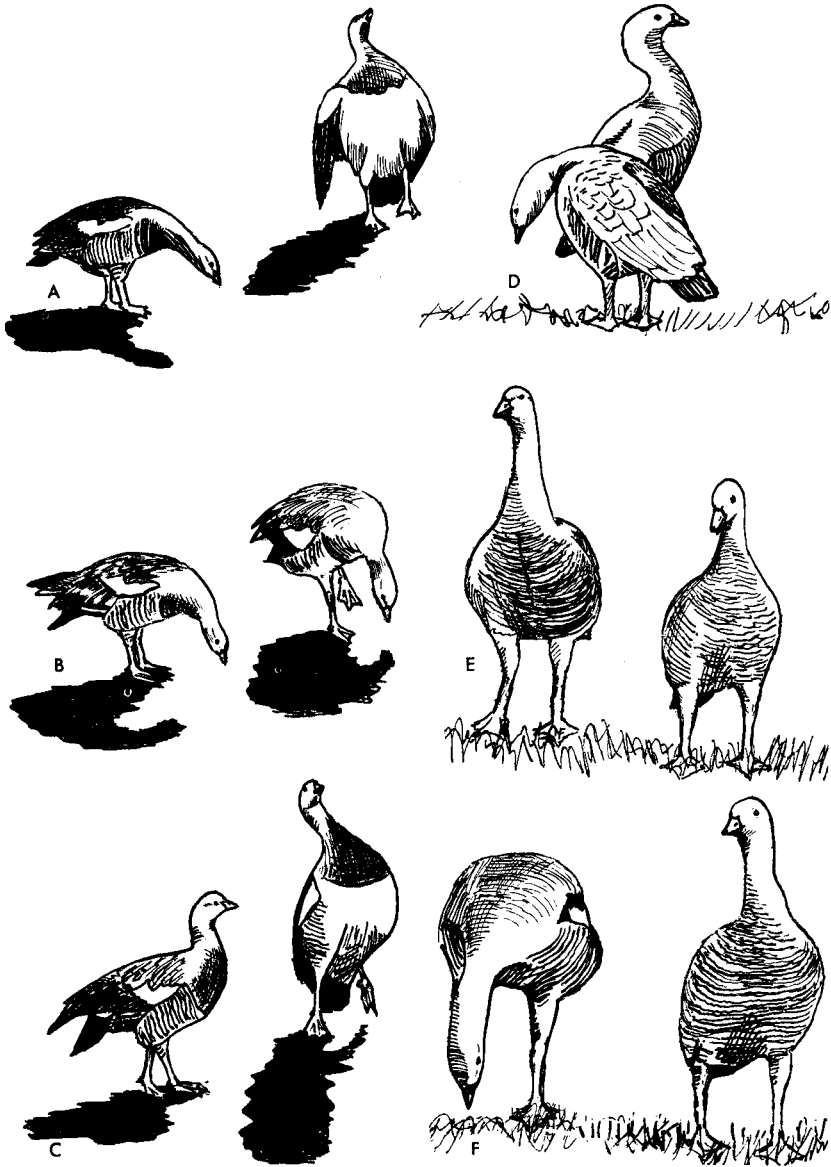


Figure 21. Ashy-headed Goose, Ruddy-headed Goose

A-C. Ashy-headed goose male (*right*) performing Puffing combined with high-intensity Bowing. Female Inciting.

D. Ashy-headed goose pair, both birds Bowing.

E, F. Ruddy-headed goose pair, the male (*left*) Bowing, the female Inciting.

the ruddy-headed and the kelp goose, the ashy-headed goose has a white eye-ring. Although the head is gray and not brown like that of the ruddy-headed goose, at least some individuals of this species exhibit a brownish trace at the back of the head and neck. The downy young also closely resemble those of the ruddy-headed goose. The tracheal bulla of the male is rather smaller than is that of the male Magellan goose (see illustration in Johnsgard, 1961c). The species is sympatric with the Magellan goose and the ruddy-headed goose, and probably also with the kelp goose. In captivity it has hybridized with two species of shelducks.

General behavior. Although small, the ashy-headed goose can be highly aggressive, and it will sometimes attack much larger birds. Like other species of *Chloëphaga*, it tends to remain in pairs throughout the year. I have not observed mutual nibbling or any preflight movements.

Agonistic and sexual behavior: female. The Inciting behavior of the ashy-headed goose appears to be identical with that of the ruddy-headed goose, but distinctly different from that of the preceding species. The tail is not raised or shaken during Inciting (Fig. 21A-C), and the female frequently makes rapid Bowing movements toward the ground as she calls in the characteristic manner of Inciting sheldgeese.

Agonistic and sexual behavior: male. The aggressive Wi-wi display of the ashy-headed goose much resembles that of the ruddy-headed goose. Although this display may be elicited at any time, it is most intense during female Inciting. On such occasions the male stands almost perfectly erect, with his wings held far enough away from his body to exhibit his white coverts, and occasionally makes rapid Bowing movements toward the female (Fig. 21B). As in the other species, the male attacks by suddenly lowering his head and rushing toward his opponent, beating it with hard blows of the wings. After an attack the male will rapidly return to the female, and sometimes he will perform a display which, both in general appearance and in the associated vocalization, is very similar to, and clearly homologous with, the Puffing display of the Andean goose (Fig. 21A). In the ashy-headed species, however, this display occurs very infrequently and always in a Triumph Ceremony situation, whereas in the Andean goose almost any disturbance will elicit it. The apparent absence of Puffing in the Magellan goose and the

ruddy-headed goose is unusual, and perhaps is related to selective pressures for isolating mechanisms in these five fairly closely related species.

Copulatory behavior. I have not seen this and have no information regarding it.

Ruddy-headed Goose (*Chloëphaga rubidiceps*)

The sexes of the ruddy-headed goose are identical in appearance and rather resemble the female of the larger Magellan goose. The ruddy-headed goose has, however, a conspicuous eye-ring and much more delicately barred patterns on the body feathers. The downy young are much like those of the ashy-headed goose. I have not seen the trachea of the male. The species is sympatric with the ashy-headed and Magellan geese, and in captivity has produced fertile hybrids with the latter. It has also hybridized with the Andean goose.

General behavior. Although the smallest of the sheldgeese, the ruddy-headed goose is highly aggressive, and what has been said about the general behavior of the ashy-headed goose applies to this species as well.

Agonistic and sexual behavior: female. Inciting in the ruddy-headed goose is identical with that in the ashy-headed goose; in both species the female frequently performs Bowing movements while Inciting (Fig. 21E, F).

Agonistic and sexual behavior: male. As in the ashy-headed goose, the male's response to Inciting is to stand extremely erect, facing his opponent with head held high and wings close to the body, and to utter the aggressive Wi-wi call. Frequently the male, facing the female and moving almost in synchrony with her, performs rapid Bowing movements (Fig. 21E, F). When uttering his call, the male usually holds his wings slightly out from the body (see Fig. 14C), exhibiting his white wing-coverts and the bony protuberances at his wrists. As in all the Tadornini these protuberances, combined with powerful wings, make effective weapons; and I am convinced that Heinroth (1911) was correct in his belief that the white on the coverts of the Tadornini (and of several species of Cairnini that use their wings in the same manner) is a kind of warning signal. Of the species here included in the Tadornini, only the Orinoco goose has no white at all on the wing coverts, although the coverts of the blue-winged goose are mostly light blue. The "flash effect" of this signal

is most striking in those species which have little or no white on the rest of the body—the ashy-headed, ruddy-headed, and Egyptian geese, and some species of shelducks. Another plumage feature which these three species of sheldgeese share with most of the shelducks is their tan to yellowish under-tail coverts. In at least some of these species, and perhaps in all of them, this region is displayed by males as a courtship signal while swimming erect in the water.

Copulatory behavior. I have no information on this.

Orinoco Goose (*Neochen jubatus*)

Although obviously a close relative of *Chloephaga*, the Orinoco goose does possess some aberrant characteristics and perhaps should be retained in a separate genus. Unlike the other sheldgeese it has black wing coverts and linings. The secondary coverts are metallic green as in *Chloephaga*, but the secondaries are mostly glossy greenish-black and have a small white circular patch. The downy young, although patterned like typical sheldgeese, have a large dark cheek mark. The male has a rudimentary tracheal bulla, similar in size and shape to those of some shelducks. The adults are alike in plumage, but the male is larger and has noticeably longer neck feathers. In captivity the Orinoco goose has hybridized with the Egyptian goose and the common shelduck.

General behavior. The Orinoco goose is not highly aggressive and seems to be more social than the other sheldgeese. Males associate freely with one another, at least during the nonbreeding period, and mutual nibbling of the feathers in the head region is particularly characteristic of this species. This occurs not only between paired birds, but also among other birds of the same or opposite sex, and social-preening “triangles” are not uncommon, especially during the postnuptial molt. Orinoco geese perch to a considerable extent in captivity, and we should expect that perching is also frequent in the dense forests which the species inhabits. Preflight movements have not been noted.

Agonistic and sexual behavior: female. During most of the year female Orinoco geese are relatively shy and inconspicuous birds, displaying little aggression toward others of their kind. As the breeding season approaches, however, Inciting may frequently be seen. The Inciting call is much like that of the Magellan or Andean goose, but the Inciting posture (Fig. 22B), unlike that of any of the

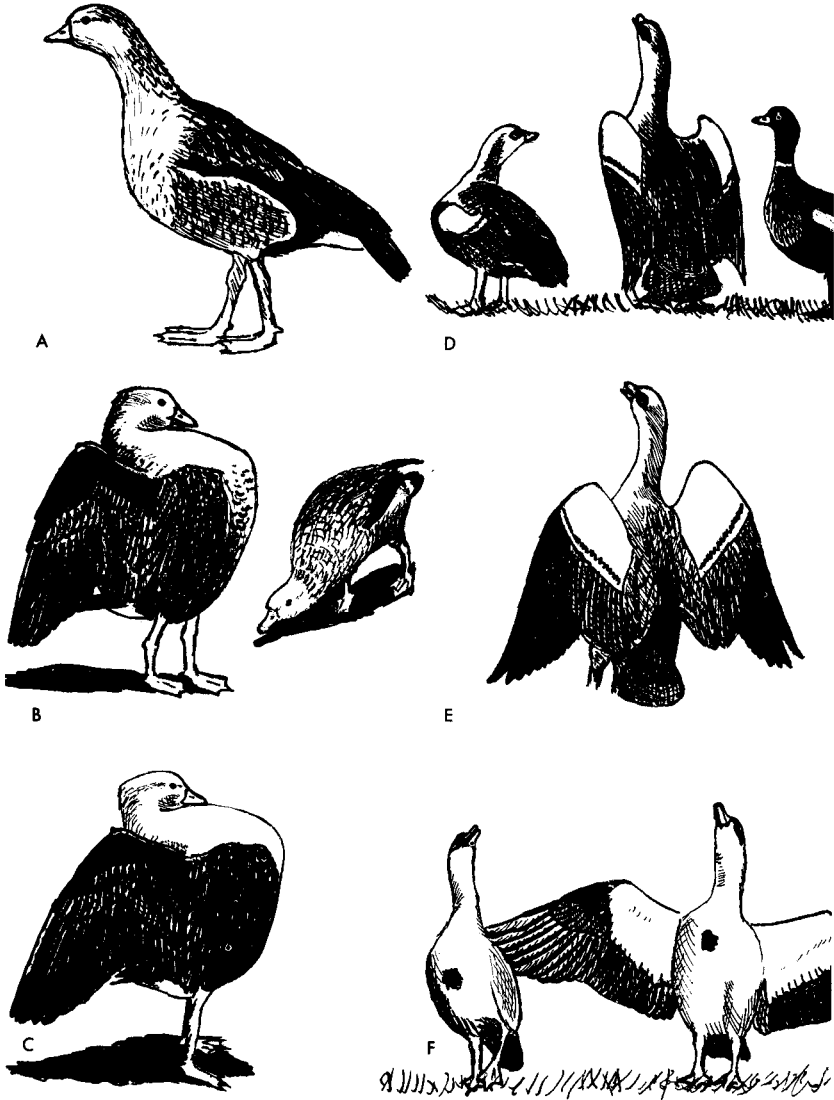


Figure 22. Orinoco Goose, Egyptian Goose

- A. Male Orinoco goose uttering whistled threat call.
- B. Male Orinoco goose (*left*) performing Puffing display as female Incites.
- C. Male Orinoco goose Puffing. Note bony protuberance at wrist.
- D. Egyptian goose pair, male (*center*) threatening Australian shelduck as female (*right*) Incites.
- E. Egyptian goose, high-intensity threat by male. Note conspicuous wing coverts.
- F. High-intensity threat by Egyptian goose.

Chloephaga species, is characterized by the fact that the neck and head are stretched out along the ground. This Inciting posture is very similar to that of shelducks. Unlike the shelducks, however, Orinoco geese never make lateral pointing movements of the bill and head. As a threat display both males and females erect their elongated neck feathers, which makes them appear to have very thick necks (illustrated in Delacour and Mayr, 1945).

Agonistic and sexual behavior: male. Male Orinoco geese have a whistling threat note and, like male sheldgeese, utter it with a diagonally outstretched neck (Fig. 22A). This call can be elicited at any time of the year, but the male's sexual display can only be observed during the period of female Inciting. In this display which is clearly homologous to the Puffing display of certain sheldgeese, the bird holds his body very erect and, with one or both of his wings extended directly backward and his head held back as far as it will go, utters a wheezy *wi-chuff*, which he repeats several times (Fig. 22B, C). The male tends to face the female, thus exposing to her view the dark underwing coverts or, at times, the upper-wing surface. The Bowing posture of the typical sheldgeese has not been observed.

Copulatory behavior. No information is available regarding this.

Egyptian Goose (*Alopochen aegyptiacus*)

Except for its larger size, the Egyptian goose might almost be called the Egyptian shelduck, for there is no doubt that the *Alopochen* is a very close relative of *Tadorna*. The downy young have the typical spotted back of the shelducks rather than the striped back of most sheldgeese, and immature birds bear a marked resemblance to immature common shelducks. Males have a left-sided tracheal bulla which is relatively small and completely ossified. The body coloration is generally similar to that of the Orinoco goose, but the wing coverts are white and the speculum is restricted to the secondaries and is of the typical shelduck type. That is, it is metallic green throughout and is bordered on the inner side by chestnut coloration. All the shelducks except one, the radjah, have specula exactly like this. The Egyptian goose and the radjah shelduck are distinctive in that the speculum is bordered in front by a black line on the white wing-coverts. The sexes of the Egyptian goose are very similar in coloration, but the male is larger and has a somewhat more contrasting color pattern. The vermiculations occurring on the body feathers

of both sexes are also typical of shelducks. None of the other sheldgeese exhibit a true vermiculated feather pattern, but one wonders whether evidence of the evolutionary origin of this interesting plumage feature, which is typical of most male Anatinae, is not to be found in the delicately barred pattern characteristic of some species of *Chloëphaga*.

The Egyptian goose is sympatric with the blue-winged goose and in captivity has produced fertile hybrids with it. Hybrids have also been obtained with Andean geese, Magellan geese, Orinoco geese, and three species of shelducks.

General behavior. The Egyptian goose has a particularly aggressive disposition, combining the almost constant fighting of the shelducks with the strength of the sheldgeese. Therefore they are not gregarious to any extent. Like shelducks, they have conspicuous pre-flight signals which consist primarily of rapid Chin-lifting movements.

Agonistic and sexual behavior: female. As Lorenz (1951-1953) has pointed out, the form of Inciting in the Egyptian goose is partly affected by the position of the object of the Inciting. The female tends to face or stand beside her mate and make threatening movements, or even short attacks, toward the opponent, calling louding and rapidly at the same time (Fig. 22D). The pointing movements of the threat are not in any degree ritualized; that is, they are wholly determined by the actual position of the opponent.

Agonistic and sexual behavior: male. Unlike the males of the sheldgeese considered previously, the male Egyptian goose does not have a whistled call. He emits, rather, gusty, strong breathing notes, reminiscent of a steam engine. Such notes appear to constitute the bird's only call, although, depending upon the degree of excitement, the call varies much in intensity and in the rapidity of the notes uttered. When mildly disturbed both birds of a pair stand together making small rotary movements of the head, similar to those made by of *Chloëphaga* in similar circumstances, with one or both birds calling softly. This leads into higher and higher degrees of excitement, until the female is rapidly and continuously Inciting her mate against an opponent; then the male, standing highly erect, suddenly and with a violent release of "steam," flashes open his wings (Fig. 22D, F). The whole display is so strongly reinforced by a sudden vocal "blast," and the flash effect of the white wing linings and coverts is

so unexpected, that, to humans at least, it is an extremely impressive threat display.

Copulatory behavior. Copulation evidently takes place when the birds are standing in shallow water, and although Heinroth (1911) did not observe this, the precopulatory display probably consists of Head-dipping movements. After copulation the male lifts the wing opposite the female to a considerable angle above his back, and this movement is probably accompanied by calling on the part of both birds (see illustration in Heinroth, 1911).

SHELDUCKS

The seven species of shelducks, of which one is almost certainly extinct, form a rather clear-cut taxonomic group. Four of the species, sometimes placed in a separate genus *Casarca*, appear to be very closely related and are, in structure and behavior, more generalized than the others. The presumably extinct species may also belong to this group. The remaining two species are more specialized in plumage, voice, tracheal structure, and behavior. The more generalized species tend to graze a good deal, whereas the two specialized forms (*T. tadorna* and *T. radjah*) obtain relatively more of their food by dabbling in muddy water.

Ruddy Shelduck (*Tadorna ferruginea*)

The ruddy shelduck may be thought of as a generalized form from which the other "Casarca" species exhibit minor variations. The downy young of all these species, with their dark "capped" heads and spotted backs, are practically identical. As adults, the sexes of the ruddy shelduck are similar, but the female has a white area around the eyes and the male has a black neck-ring and buff-colored rather than white upper-wing coverts. The rusty-tan of the under-tail coverts in this species is essentially the same color as appears on the rest of the body, and I believe that this color is a primitive feature. The trachea of the male has a very small, almost rudimentary, bony bulla at the syrinx (see illustration in Johnsgard, 1961c). The ruddy shelduck occurs over much of Asia and parts of Europe and Africa. It has produced fertile hybrids with the Egyptian goose and with the three other "Casarca" species, and it has also hybridized with common and radjah shelducks.

General behavior. Heinroth (1911) has discussed at length the general behavior of the ruddy shelduck and its near relatives, and has described its aggressive behavior especially well. Chin-lifting, together with lateral Head-shaking, is the preflight movement.

Agonistic and sexual behavior: female. Although Delacour (1954) believes that shelducks mate for life, I doubt that pair bonds are nearly so strong in shelducks as they are in geese or in sheldgeese. Heinroth (1911) has given examples of how a female shelduck will repeatedly attach herself to a new mate (often to one of a different species), her choice being dependent simply upon which male will respond to her Inciting most strongly. An understanding of this aspect of mate selection makes clear the reasons for the tendency toward the sexual dimorphism—in strength, size, and appearance—that occurs in the shelduck group, or at least in the “Casarcas.” As Heinroth has explained, it is in this group that females overtly “court” various males to a much greater extent than in any other duck group, and thus there is a tendency toward a reversal of the normal sexual selection process. I am certain that this accounts for the trend toward bright female plumages in these species—a trend which is uniquely culminated in the paradise shelduck, the female of which has distinct breeding (red) and nonbreeding (gray) plumages, whereas the male has the same (gray) plumage all year. Heinroth has also pointed out the correlation between the amount of contrasting white plumage on the heads of the female “Casarcas” and the relative strengths of their tendencies toward Inciting. There is least white on the females of ruddy and Australian shelducks, more on the female of the Cape shelduck, and most on the female of the paradise shelduck—and the last-mentioned is certainly the greatest Inciter.

The Inciting of the female ruddy shelduck is of particular interest, for it illustrates the trend toward the ritualization of the pointing component. During Inciting the female holds her head low over the ground or water with her neck outstretched, calling *gaaa* repeatedly, and frequently making lateral pointing movements with her bill toward the opponent. As Lorenz (1951–1953) has already pointed out, however, this lateral pointing movement is to some degree stereotyped, and may even occur if the opponent is facing directly ahead of the female. This is an important point, for it will be seen that in some of the following tribes the movement has become com-

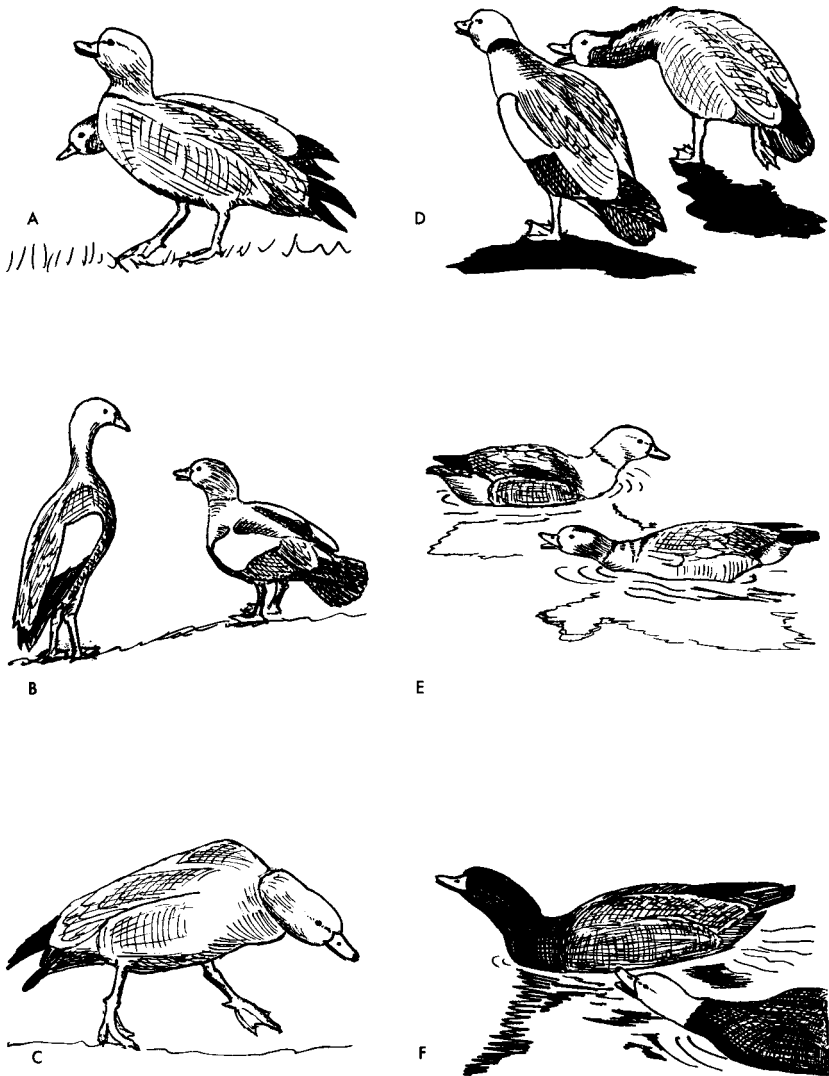


Figure 23. Ruddy Shelduck, Cape Shelduck, New Zealand Shelduck

- A. Ruddy shelduck pair. Male (*in foreground*) uttering threat call.
- B. Ruddy shelduck female threatening male ruddy-headed goose. Compare the postures of the two species.
- C. Female ruddy shelduck in attack posture.
- D. Cape shelduck pair, female (*right*) Inciting.
- E. Cape shelduck pair, female (*right*) Inciting while male utters his threat call.
- F. New Zealand shelduck pair, female (*in foreground*) Inciting while male utters his threat call.

pletely ritualized, and is almost entirely independent of the position of the object of the Inciting. If it were not for such examples of only partially ritualized movements as are afforded us by the female ruddy shelduck, the significance of these completely ritualized movements would be much more difficult to understand.

Agonistic and sexual behavior: male. The male's response to Inciting is usually to utter one of two calls, which appear to be basically different in function. The call of male ruddy (and the other "Casarca") shelducks is unlike the whistle of the typical sheldgeese; it is a strong honking call described by Heinroth (1911) as *chorr*, with the predominant tone O rather than A as with females. The one-syllable *chorr* response is indicative of threat, and is analogous to the Wi-wi threat of typical sheldgeese. The other call, however, a two-syllable *cho-hoo'*, is, I believe, sexually motivated and thus analogous to the Puffing call of some sheldgeese. In giving this call the male often jerks his head back and sometimes lifts his tail, thus assuming a High-and-erect posture that seems to exhibit the under-tail coverts. As the female begins Inciting, the male usually makes his *chorr* call (Fig. 23A, B), but this is later often replaced by the two-note sexual call, just as in the Andean goose the Wi-wi call is usually replaced by Puffing at higher degrees of excitement.

Copulatory behavior. Ruddy shelducks copulate in water deep enough for the birds to swim in. The precopulatory display consists of mutual Head-dipping movements, with the male frequently uttering his two-note call. As treading is completed, the female begins to call before the male does. After the male begins to call, he remains mounted a few seconds, still holding the female's nape; then he slightly lifts the wing opposite the female and slides off to one side in a High-and-erect posture. Both birds then begin to bathe.

Cape Shelduck (*Tadorna cana*)

The Cape, or South African, shelduck is certainly very closely related to the ruddy shelduck, and the two forms might best be thought of as a superspecies. The downy plumage is slightly lighter in color than is that of the downy ruddy shelduck; and adults of the two species differ mainly in that both sexes of the Cape shelduck have ashy-gray rather than buff-colored heads, and the white area on the head of the Cape shelduck female is larger than that on ruddy shelduck females. In addition, the flank and back feathers are strongly

vermiculated, a feature which is even more pronounced in the three following species. The male trachea is almost identical with that of the ruddy shelduck. The species is not sympatric with any other shelducks, but in captivity it has produced fertile hybrids with the ruddy shelduck and has also hybridized with the paradise and common shelducks.

General behavior. Except for having a somewhat more aggressive disposition, the Cape shelduck is in almost every way very similar to the ruddy shelduck. In the fights I have seen between the ruddy shelduck and the Cape shelduck, the latter has always been the victor. Chin-lifting and, to a smaller extent, lateral Head-shaking are the preflight movements.

Agonistic and sexual behavior: female. The Inciting call and posture of the Cape shelduck are exactly like those of the ruddy shelduck (Fig. 23D, E). As is true of that species, Inciting can be elicited throughout the year, but is most frequent during spring.

Agonistic and sexual behavior: male. The male's response to Inciting is like that of the ruddy shelduck. The one-syllable threat note might be written as *korrr*, and the two-note sexual call as *ka-thoo'*. At the same time as the latter note is uttered the head is jerked up and back, and the characteristic High-and-erect posture is assumed. This differs from the threat call posture, in which the head is held forward and the neck is outstretched (Fig. 23D, E).

Copulatory behavior. Treading occurs in water of swimming depth, and pronounced Head-dipping movements resembling bathing are performed by the male and less often by the female. Treading is like that of the ruddy shelduck, with the female beginning to call several seconds before the male calls and dismounts. In this species the male lifts the wing on the side opposite the female to a directly vertical position, holding it in that position for several seconds while in a High-and-erect posture. Both birds then begin normal bathing.

Paradise Shelduck (*Tadorna variegata*)

The paradise, or New Zealand, shelduck should perhaps be placed between the Cape and the Australian shelduck, although geographical distributions suggest that the Australian species should be placed between the other two. The downy plumage of the paradise shelduck is very dark above and is much like that of the ruddy shelduck. The breeding plumage of the adult female (all shelducks

apparently have two body molts per year, but this double molt is conspicuous only in the paradise shelduck) is a rich reddish chestnut, with vermiculations on the back and flanks. In nonbreeding plumage the female has a grayish body similar to that of the male. In both plumages the female's head is pure white. The male has at all times a dark gray body and a glossy greenish-black head, but his under-tail coverts and his wings are of the typical shelduck color and pattern. There is a greater sexual dimorphism of size and color in this species than in any of the other shelducks. The male tracheal bulla is slightly larger than those of the two preceding species and, in size and shape, approaches the bulla found in the Australian shelduck (J. V. Beer, pers. comm.). The paradise shelduck is not sympatric with any near relatives, but in captivity it has formed fertile hybrids with the ruddy shelduck and has also hybridized with common and Cape shelducks.

General behavior. As we would expect from the distinct breeding and nonbreeding plumages of the female, this species tends to be more seasonal in its social behavior than are the other species of the group. When the female is in her gray plumage, it is in my experience impossible to elicit Inciting; but when she is in her breeding plumage, it is almost impossible to *avoid* eliciting it. As in the other shelduck species, preflight signals consist primarily of Chin-lifting, with some lateral Head-shaking.

Agonistic and sexual behavior: female. Inciting in this species is of the typical shelduck type already described (Fig. 23F), differing only in its frequency and intensity. The lateral bill and head movements made during Inciting are especially conspicuous as a result of this bird's striking white head-plumage. Heinroth (1911) has described how a female paradise shelduck paired with an ashy-headed goose rather than with a male of her own species, illustrating well the tendency of females to court the largest and strongest potential mates.

Agonistic and sexual behavior: male. The calls and reactions of the male paradise shelduck are very much like those of males of the preceding species. The threat and the sexual calls are somewhat lower in pitch than are those of the other forms, and they may be written as *horr* and *ha-hoo'* respectively. The sexual call is usually uttered in the High-and-erect posture.

Copulatory behavior. Although the copulatory behavior of this species is no doubt similar to that of the other "Casarcas," I have no information on it.

Australian Shelduck (*Tadorna tadornoides*)

The Australian shelduck is certainly a close relative of the paradise shelduck, but its downy young are also very similar to those of the Cape shelduck. Its adult plumage, however, is to some degree reminiscent of the common shelduck, and there are a few elements of behavior which are indicative of this affinity as well. I have not seen the male trachea, but to judge from the voice, it cannot be very different from those of the other "Casarcas." Unlike those of the other typical shelducks, the under-tail coverts are greenish black rather than brownish. The plumage of the female is much like that of the male, and the white area on the head is restricted to the region around the eyes. The only near relative with which it may be sympatric is the radjah shelduck. In captivity it has hybridized with the common shelduck and produced fertile hybrids with the ruddy shelduck. The tracheal bulla of the male is larger and more strongly ossified than those of the three preceding species (J. V. Beer, pers. comm.).

General behavior. In general behavior the Australian shelduck appears to be a typical "Casarca." The birds are not gregarious, and remain rather aggressive throughout the year. As in the other species, Chin-lifting and lateral Head-shaking movements constitute preflight signals.

Agonistic and sexual behavior: female. Inciting is essentially the same as it is in the other shelducks (Fig. 24A). There is much lateral pointing, and the greenish-black head contrasts vividly with the brownish breast.

Agonistic and sexual behavior: male. The male Australian shelduck responds to Inciting with either the one-syllable threat call *ho* or the two-syllable call *ha'-poo* (Fig. 24A). In this species the emphasis of the latter call tends to be on the first syllable, rather than on the second as it is in the paradise shelduck. The two-note call is uttered in the High-and-erect posture typical of the group (Fig. 24B, C). During a state of general excitement, both sexes, and especially the male, sometimes perform a body shake, but there does not appear to be any call associated with this shake, nor is it especially different from the normal general shake. The fact that the common shelduck male has a highly ritualized Whistle Shake (Lorenz, 1951-1953; Fig. 26A) which derives from the general shake makes this behavior of particular interest.

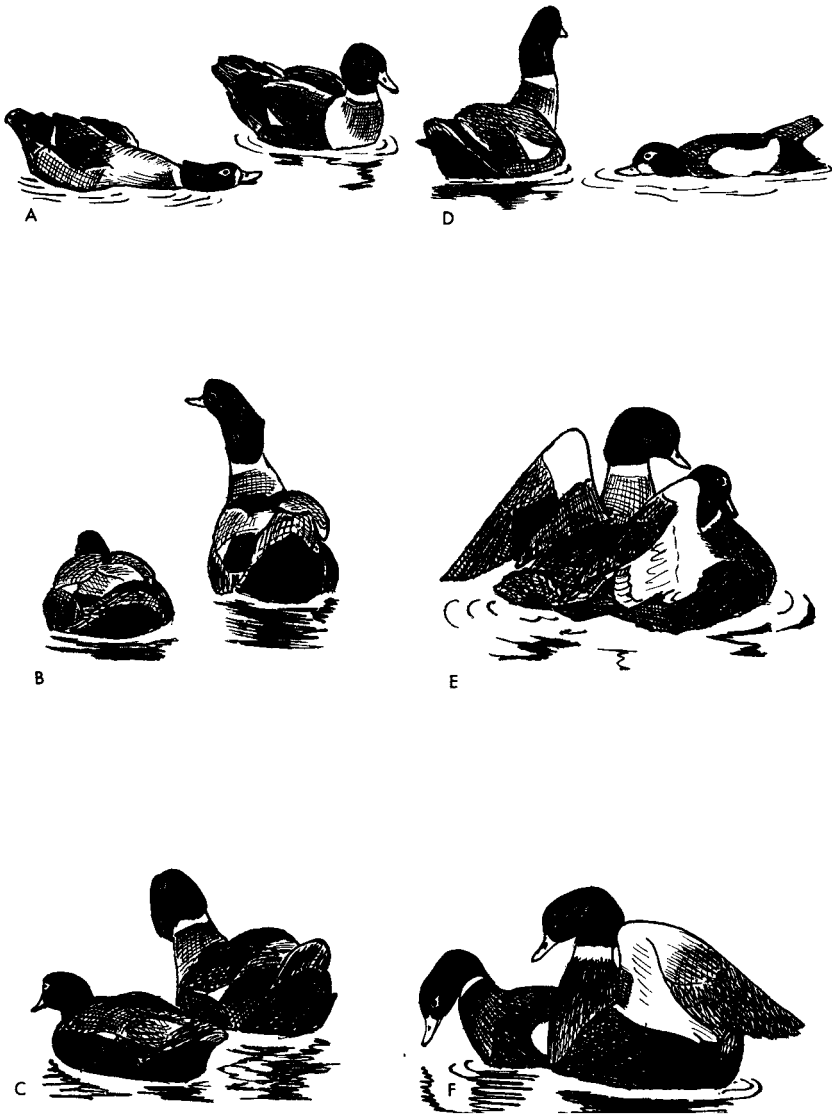


Figure 24. Australian Shelduck

- A. Female (left) Inciting as male utters threatening notes.
- B, C. Male calling in High-and-erect posture during precopulatory display. Note cocked tail and sleeking of the male's head feathers (except in nape region).
- D. Precopulatory display, male in High-and-erect posture while female is in prone position.
- E, F. Early and late phases of postcopulatory display. In the late phase the female is about to begin bathing.

Copulatory behavior. Head-dipping by the male, alternated with calling in the High-and-erect posture, appears to be the typical precopulatory behavior of Australian shelducks (Fig. 24B, C). The female may also perform Head-dipping before she goes into a receptive position (Fig. 24D). The postcopulatory display is a most elaborate one, with the female calling loudly as copulation is completed, and with both birds lifting the wing opposite the partner as they swim about in High-and-erect attitudes (Fig. 24E). The female does not assume quite so extreme a posture as the male, and after a few seconds she begins to bathe (Fig. 24F).

Crested Shelduck (*Tadorna cristata*)

This almost certainly extinct and practically unknown species is included at this point simply on the basis of its general appearance. There can be no doubt that the few specimens known represent a true species rather than a hybrid, for both the wing pattern and the under-tail coloration are perfectly typical of *Tadorna*. The male is more grayish than the female, and has a black chest similar to that of the paradise shelduck. Since the female has a relatively white head, vermiculated flanks, and under-tail coverts of a yellowish brown, it seems probable that this species is a member of the "Casarca" group.

Common Shelduck (*Tadorna tadorna*)

The common shelduck and the radjah shelduck represent, I believe, two rather specialized offshoots of the shelduck group. Although the males of both species have whistling voices, and although both sexes of the two species exhibit a great deal of white in their plumages, and feed to a greater extent on animal material than do the preceding shelducks, the species are perhaps not very closely related. The downy common shelduck has a striped back and large black "cap," and is rather distinct from the downy radjah shelduck. Unlike those of the other shelducks, the juveniles of this species have a plumage which is different from the plumage of either parent and resembles in some respects the juvenile plumage of the Egyptian goose. The adults of the two sexes are very similar; the female is slightly smaller than the male, has a less brilliantly green head, and lacks the bill enlargement typical of the male. The trachea of the male is unique, for the bulla is inflated on both the right and left sides to roughly the same degree. The common shelduck occurs over most of Europe and Asia, and is broadly sympatric with the ruddy

shelduck. In captivity it has hybridized with this species and also with the radjah, Cape, and Australian shelducks.

General behavior. This species is a relatively gregarious one, at least during the nonbreeding season. The postbreeding flocking and migration to restricted molting areas is well known. As in the other shelducks, preflight movements include lateral Head-shaking and, probably, Chin-lifting.

Agonistic and sexual behavior: female. Inciting behavior is of the same form, and has generally the same vocal characteristics, as that of the preceding species. As in them, the lateral pointing movements are distinctly ritualized (Fig. 25A, B). Besides the Inciting display, the female has a second courtship display of interest. This is Preening-behind-the-wing (Fig. 25C), which exposes the female's metallic speculum to her mate. This usually occurs after the male returns from an attack on his opponent and Preens-behind-the-wing on the side toward the female. She almost invariably responds to this display by also Preening-behind-the-wing, on the side toward the male. The preening movement appears to be almost functional, in contrast to the highly ritualized preening movements typical of most perching ducks and dabbling ducks. Except for certain swan species (mute, black, and probably black-necked), in which preening in various areas occurs in precopulatory or Triumph Ceremony situations, this is the only species discussed so far which definitely utilizes ritualized preening as a sexual display. Thus it is clear that the metallic-colored speculum of the other shelducks and sheldgeese did not evolve in association with this display; but perhaps it evolved in connection with the postcopulatory display of lifting the wings, or with the slight lifting of them during various courtship displays such as Puffing. In the common shelduck the speculum has perhaps secondarily been modified into a special courtship signal by the ritualization of the movements involved in preening behind the wing.

Agonistic and sexual behavior: male. The voice of the male common shelduck is totally unlike that of males of the "Casarca" group. It is a soft, melodious, and high-pitched whistle not very different from that of some cardueline finches. It may be uttered while the bird is holding his neck erect and his head motionless, while he is performing rotary pumping movements of the head and neck (Fig. 25A, B) in hostile situations, or while he is flicking his head to the vertical position (Fig. 26B, C). The significance of these different postures in calling is not at all clear. The first-mentioned posture

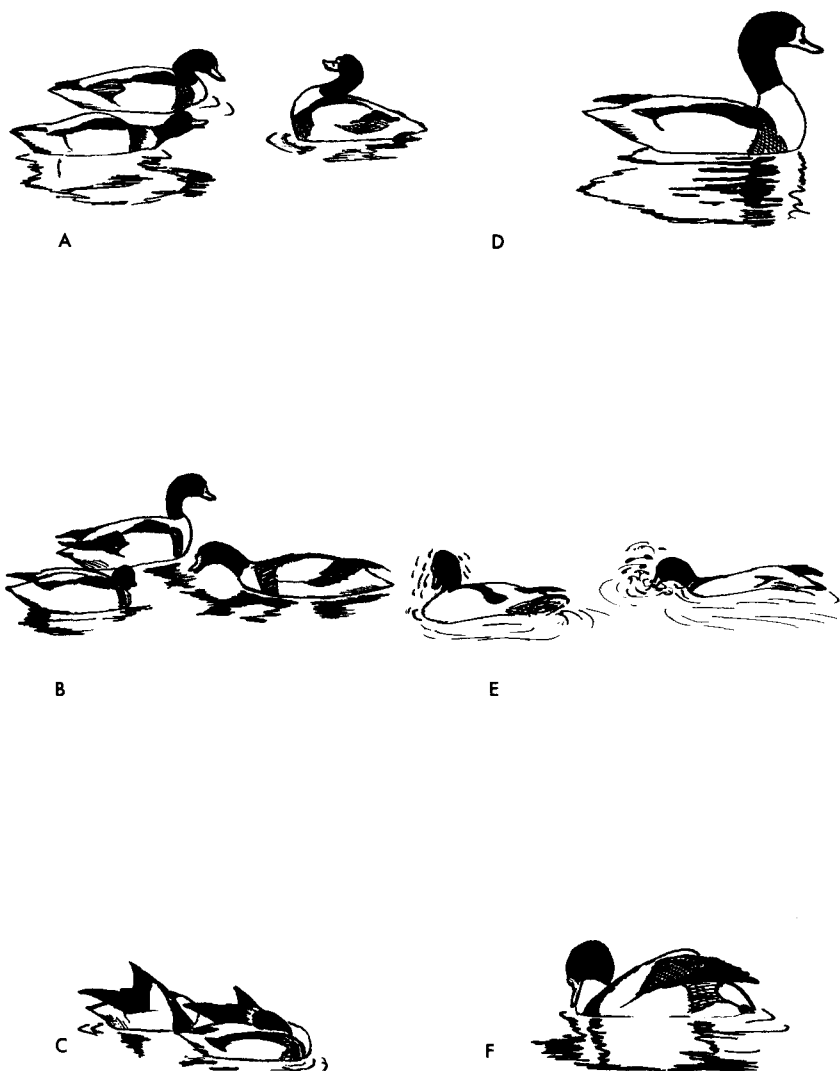


Figure 25. Common Shelduck

- A, B. Female (*left foreground*) Inciting her mate (*right*) to attack other male (*rear center*). Both males are performing rotary pumping movements of head.
- C. Mutual Preening-behind-the-wing by a pair after the male (*in foreground*) has returned from an attack.
- D. Male calling in High-and-erect posture.
- E. Precopulatory Head-dipping by a pair (*male on left*).
- F. Postcopulatory High-and-erect posture. The male has just released the female (*hidden behind him*) and is raising the nearer wing slightly.

seems to correspond to the High-and-erect courtship posture of the shelducks already described (Fig. 25D). The vertical head-flicking may simply be an exaggerated preflight movement. The rotary pumping movement is the usual male response to Inciting, and may have sexual as well as hostile implications. It is clearly a threat display toward other birds, and is often followed by an overt attack in which the bird flies over the water surface, striking with its outstretched wings. As the male returns to his mate he Preen-behind-the-wing in the manner already described (Fig. 25C). A second major display of uncertain significance is the Whistle Shake (Fig. 26A), which is an exaggerated general shake accompanied by a whirring whistle. This behavior occurs throughout the year, and completely replaces the ordinary, or autochthonous, general shake. It occurs frequently when the birds have been disturbed by a person coming into view, and may function as a kind of alarm signal, but it also occurs at times during an aggressive display. Females shake in a less exaggerated manner than males, and they lack the whistling call.

Copulatory behavior. The precopulatory display consists of a very vigorous Head-dipping by both birds while they are swimming rapidly; hence the movements sometimes appear to be shallow dives (Fig. 25E). Often a female appears to be fleeing from the male, but sometimes she assumes a prone and motionless posture in the water. When this happens the male normally Preen-behind-the-wing before he mounts, in exactly the same manner as he does after an aggressive encounter. Treading is like that of the preceding species, and as the female begins to call the male grasps her nape even harder than he has before and pulls her head back, causing the birds to rotate slightly in the water; at the same time the male assumes a High-and-erect posture, with the wing opposite the female slightly raised (Fig. 25F). When he finally releases the female, she begins to bathe immediately.

Radjah Shelduck (*Tadorna radjah*)

The radjah shelduck occupies an extreme position, representing a highly specialized species, in the genus *Tadorna*. The downy young have brown "caps" and reduced back spotting, and are quite distinct from other downy shelducks. The trachea of the male has a bulla which is different from those of the "Casarcas" as well as from that of the common shelduck, and which is quite similar to the bullae of the typical dabbling ducks (see illustration in Johnsgard, 1961c). The

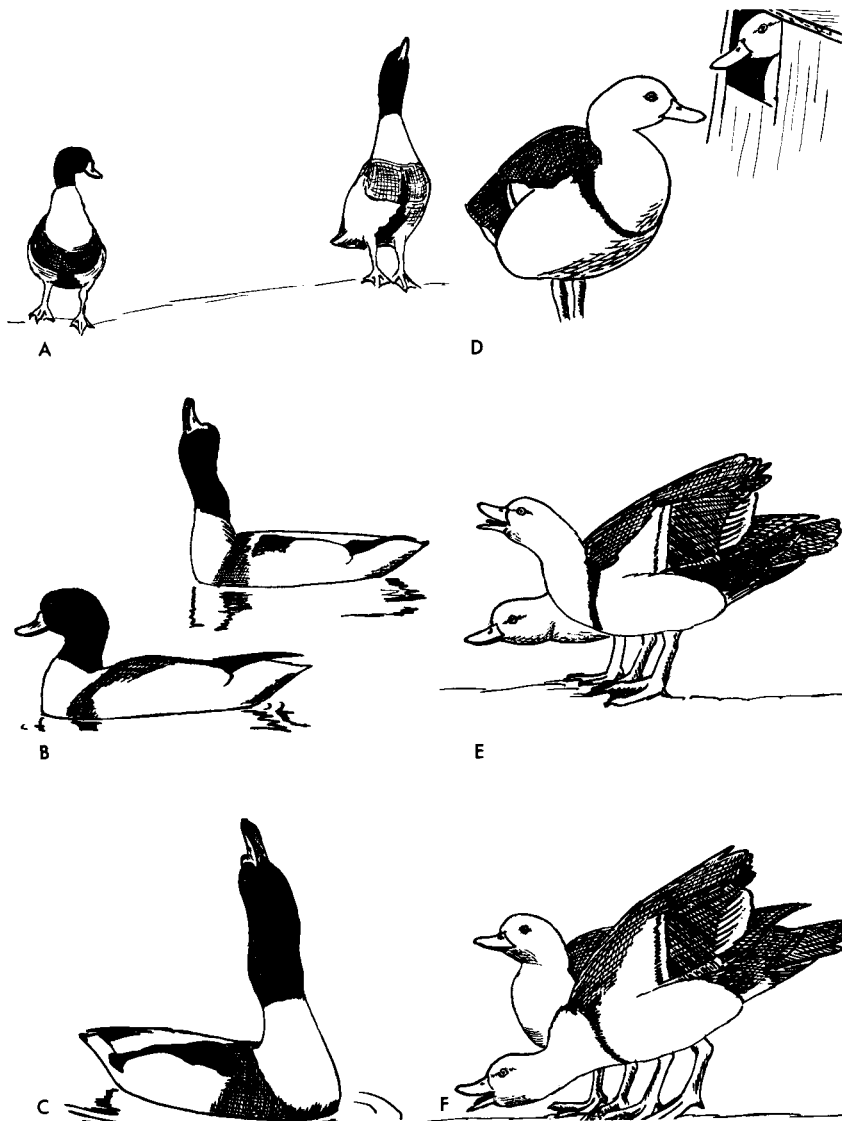


Figure 26. Common Shelduck, Radjah Shelduck

A. Male common shelduck (*right*) performing Whistle Shake.

B, C. Male common shelduck calling with bill held vertically.

D. Radjah shelduck pair. Female investigating nesting box as male waits outside.

E, F. Threat display in radjah shelducks. Both birds are calling and performing diagonal movements of the head toward the opponents.

adult plumages of the sexes are identical, and unless one hears the birds call, it is extremely difficult to distinguish one sex from the other. The white plumage pattern is rather like that of the common shelduck, but this may be only a superficial similarity. The wing pattern of the radjah is more specialized than that of the other species of *Tadorna* in that the metallic speculum is bordered in front by a black line (as it is in the Egyptian goose) and in the rear by a broad white border. The under-tail coverts are gray to white, and thus also are not typical of *Tadorna*. The species, which has been divided into two races, occurs from northern Australia to New Guinea and the surrounding islands, and is probably not sympatric with any near relatives. In captivity it has hybridized with ruddy and common shelducks.

General behavior. Although not an especially powerful bird, the radjah shelduck often, throughout most of the year, engages in aggressive displays, but it restricts its attacks to birds of its own size or smaller. Pair bonds appear to be fairly strong in the species. I have not observed any preflight movements. Although all species of shelduck are cavity nesters, the radjah is apparently the only one which typically nests in tree holes, and it may also select nesting boxes for its site (Fig. 26D).

Agonistic and sexual behavior: Female. The voice of the female is rather less ducklike than that of the females of the other shelduck species, and is a wheezy, low-pitched note that could scarcely be termed a quack. Inciting takes a specialized and aberrant form in this species; the female makes diagonal pumping movements forward and downward in the direction of the opponent, and there are no lateral bill movements at all (Fig. 26E, F). The folded wings are raised during this Inciting, revealing the speculum. I have not, however, observed Preening-behind-the-wing by either sex.

Agonistic and sexual behavior: male. The whistling voice of the male is somewhat like that of the male common shelduck, but it is stronger, more wheezy, and less variable in pitch. Like the male common shelduck, the male radjah may call when he is holding his head stationary, as when, for example, he appears to be curious. But he calls loudest when he is responding to Inciting, at which time he stands beside or slightly facing the female and makes rapid and repeated diagonal pumping movements similar to those of the female. The male's movements are more energetic, however, and he usually raises the folded wings higher above his back (Fig. 26E, F). This

mutual display may constitute either a threat toward other birds or a Triumph Ceremony after an aggressive encounter.

Copulatory behavior. On various occasions I have seen what was clearly precopulatory behavior, with the male performing repeated Head-dipping movements in front of the female, to which she did not overtly respond. On one occasion I saw the female lying prone while the male attempted to mount. After several unsuccessful attempts, copulation was apparently completed. As the male released the female he raised the wing opposite her almost vertically for a moment, then lowered it. The female did not raise her wing at all, and neither bird assumed the expected High-and-erect postcopulatory posture. Thus either this single observation was not typical, or radjah shelducks have a postcopulatory display quite different from that of the other shelducks. I was unable to determine whether either bird called after the copulation.

TRIBE TACHYERINI (STEAMER DUCKS)

Following the arrangement of von Boetticher (1952) and the suggestion of Moynihan (1958), I shall here consider the three species of steamer ducks of the genus *Tachyeres* to constitute a separate tribe. These authorities agree that although steamer ducks are perhaps most closely related to the true shelducks, the steamers are sufficiently different to warrant removing them from the shelduck tribe. Their downy young lack the strongly contrasting coloration typical of shelducks, and the adult plumage pattern is distinct both from that of the shelducks and from that of the other anatine groups. There is a slight sexual dimorphism in bill color, head color, and possibly in the degree of tail-feather curling. Pair bonds appear to be strong, and Murphy (1936) was of the opinion that steamer ducks pair for life. At least two years are required for the birds to reach maturity. There are apparently three similar-appearing species, of which two are virtually flightless. The voices of the sexes are very different, and the males have tracheae with rounded, osseous bullae which are similar to those of *Anas* (see illustration in Johnsgard, 1961c). There is no metallic coloration in either sex; the wings have white secondaries and secondary coverts. All species dive extremely well, and the birds feed to a great extent on marine animal life off coastal South America and the Falkland Islands. I have observed two species, the Falkland flightless steamer duck (*T. brachypterus*) and the Magellanic flightless