2010

Ducks, Geese, and Swans of the World: Tribe Cairinini (Perching Ducks)

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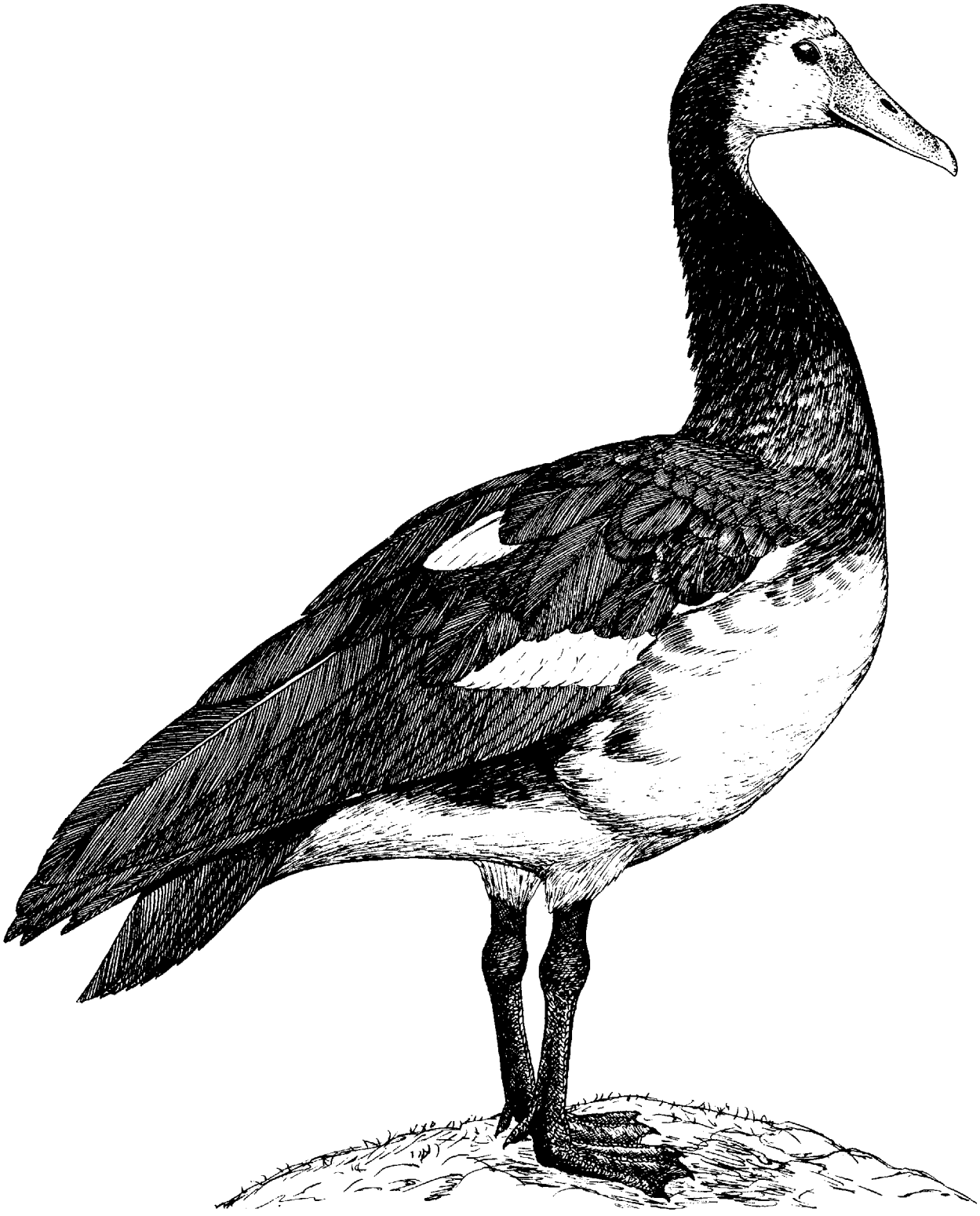
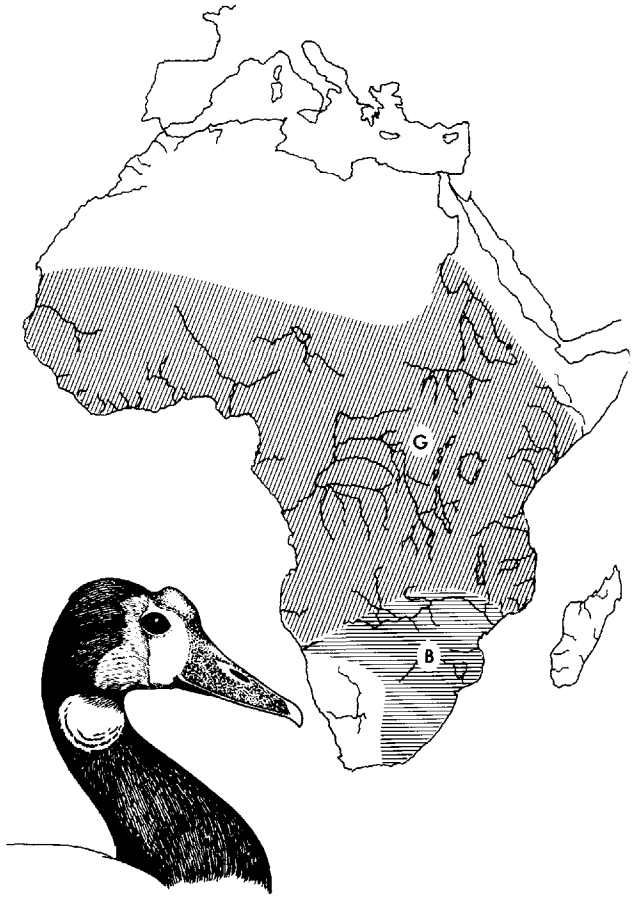
Tribe Cairinini (Perching Ducks)



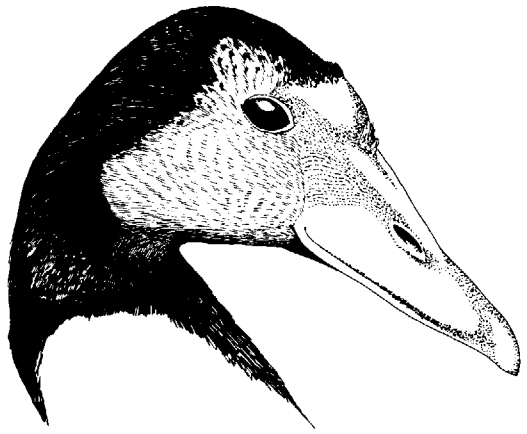


MAP 48. Breeding or residential distributions of the black ("B") and Gambian ("G") spur-winged geese.

Drawing on preceding page: Spur-winged Goose

Spur-winged Goose

Plectropterus gambensis (Linnaeus) 1766



Other vernacular names. None in general English use; Sporengans (German); oie armée (French); ganso africano de espolón (Spanish).

Subspecies and ranges. (See map 48.)

P. g. gambensis: Gambian spur-winged goose. Resident in Africa from Gambia, Kordofan, and the White Nile south to at least the Zambesi.

P. g. niger: Black spur-winged goose. Resident in Africa from the Cape of Good Hope northward perhaps through Botswana, but intergrading over a wide area with *gambensis.*

Measurements and weights. Folded wing: males, 530–50 mm; females, 422–40 mm. Culmen (from nostril): males, 59–63 mm; females, 57–59 mm. Weights: males, 5.4–6.8 kg (rarely to 10.0 kg); females, 4.0–5.4 kg. Eggs: av. 73 x 56 mm, white, 140 g.

Identification and field marks. Length 30–39″ (75–100 cm). Plate 29. *Adults* are extensively iridescent bronze and green on the upperparts, including the neck and feathered parts of the head, which from the vicinity of the eyes forward is featherless and bluish or reddish. The underparts, including the under tail coverts, are white. The white extends up the breast in *gambensis* and also appears on the face in that race. The bill is red and variably extended into a knoblike caruncle on the crown; the legs and feet are pale pink. The wing is spurred at the bend and mostly iridescent bluish green, but with all the under wing coverts and variable amounts of the upper coverts white. The tail and upper tail coverts are blackish. *Females* are smaller than males and have duller facial coloration and smaller bill caruncles. *Immatures* of both sexes lack bare facial skin and an enlarged bill, and are browner on the face and neck. Most of the body feathers are fringed with brown, and the white areas on the wings and underparts are more restricted than in adults. The spur on the wing appears within a month of hatching and gradually enlarges.

In the field, the long-necked and long-legged appearance of this species and its black and white pattern make it unmistakable for any other African waterfowl (but the appearance is reminiscent of the Australian magpie goose). Males produce a high-pitched whistling note, and a similar repeated *chi* sound is uttered by females when agitated. A double-noted huffing sound is also made by males when threatened.

Natural History

Habitat and foods. This species is common and widespread over Africa, occurring in fields of crops or grasslands in the early morning, at dusk, or at night, and resting in swamps or open water during the rest of the day, sometimes perched in trees. In South Africa it is usually found along the larger rivers and the edges of lakes, vleis, dams, reservoirs, marshes, and swamps. During the dry winter months, flocks of nonmolting birds often fly into cultivated fields at daybreak to forage, returning a few hours later. They make a second flight out at about sunset, but remain in the fields at night only when there is moonlight to provide adequate light. During the rainy season, however, the birds remain in the fields all day, presumably because water is available there and thus they are not forced to return to their roosting areas for it. The adults feed primarily on the shoots and seed heads of grasses, the soft parts of aquatic plants such as water lilies, and a variety of grain and tuberous crops. A few observers have reported that they consume such animal materials as small fish (Clancey, 1967).

Social behavior. Flock sizes in this species are sometimes fairly large, especially in roosting areas. In favorable roosting or grazing areas, the birds are often seen in flocks of 50 or more, while on waters where molting birds congregate the numbers may go much higher. As many as 2,000 birds were reported in a molting area at Barbarspan, southwestern Trans-

vaal, from June to August one year, while only half that many were seen the following one. The molting period is unusually long, lasting from six to seven weeks, and thus there is a need for safe and dependable water areas during this period. Although the birds are probably fairly sedentary over much of their range, there are marked seasonal changes in numbers in many areas. In the Luangwa Valley of Zambia, for example, the species is present mainly during the rainy season. In Zambia there are nesting records spanning nine months from September through May, but the majority are from January through March. In South Africa most breeding occurs between September and January, apparently corresponding to the rainy period of the spring and summer months (Clancey, 1967). Almost nothing is known of the pair-bonding behavior of this species; if it is like that of the other larger forms of perching ducks, pair bonds are virtually lacking. Likewise, no information is yet available on copulatory behavior.

Reproductive biology. Evidently a fairly wide variety of nest sites are accepted by females of this species, but most often the nests are built in grass or reed beds, and are substantial constructions of roots, twigs, herbaceous vegetation, and whatever other materials are immediately available. Nests have also been found among rocks in termite mound cavities, and on the nests of other large birds, such as the hammerhead (*Scopus umbretta*). The nest cup is relatively deep and well lined with down during the period of egg laying. Clutch sizes are quite variable, from 6 or 7 at the lower extreme to 14 or 15 at the upper extreme. In one case 8 eggs were known to be laid over a period of 9 days. Incubation is by the female alone, and requires from 30 to 32 days to be completed. Although it is said that the male remains until the clutch is completed, there seems to be no indication that the pair bond persists much longer or that the male participates in caring for the young. The fledging period is slightly more than two months (Clancey, 1967). However, since the molting period at Barberspan, South Africa, is from June to August, either nonbreeders must molt at a later time or the postnuptial molt of breeding adults must be considerably delayed.

Status. This species is still the commonest of the gooselike waterfowl in Africa, which is perhaps a testament to its wariness and adaptability to settlement conditions. Although it is regarded highly by sportsmen as a target, it is very hard to bring down and is often considered inedible except perhaps for the younger birds.

Relationships. This species seems to be one of the most primitive of the subfamily Anatinae, although its terrestrial adaptations may be secondary and its similarities to the magpie goose may be mostly superficial. In its general plumage sequences and its social behavior it seems fairly close to the genera *Cairina* and *Sarkidiornis*, and collectively these genera seem to be stem forms of the anatine stock. Curiously, Woolfenden (1961) noted a number of sheldrakelike osteological features in the spur-winged goose and considered it an aberrant member of this tribe. Assuming that the primitive Anatinae radiated from shelducklike birds, these similarities should not be too surprising.

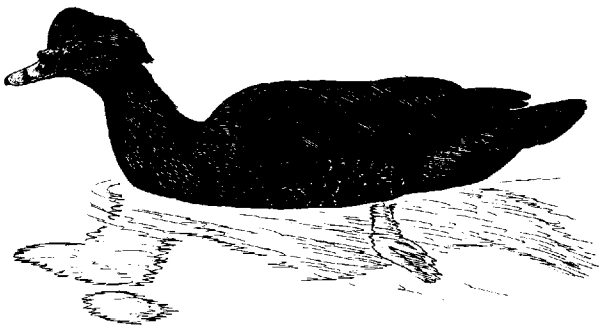
Suggested readings. Clancey, 1967.

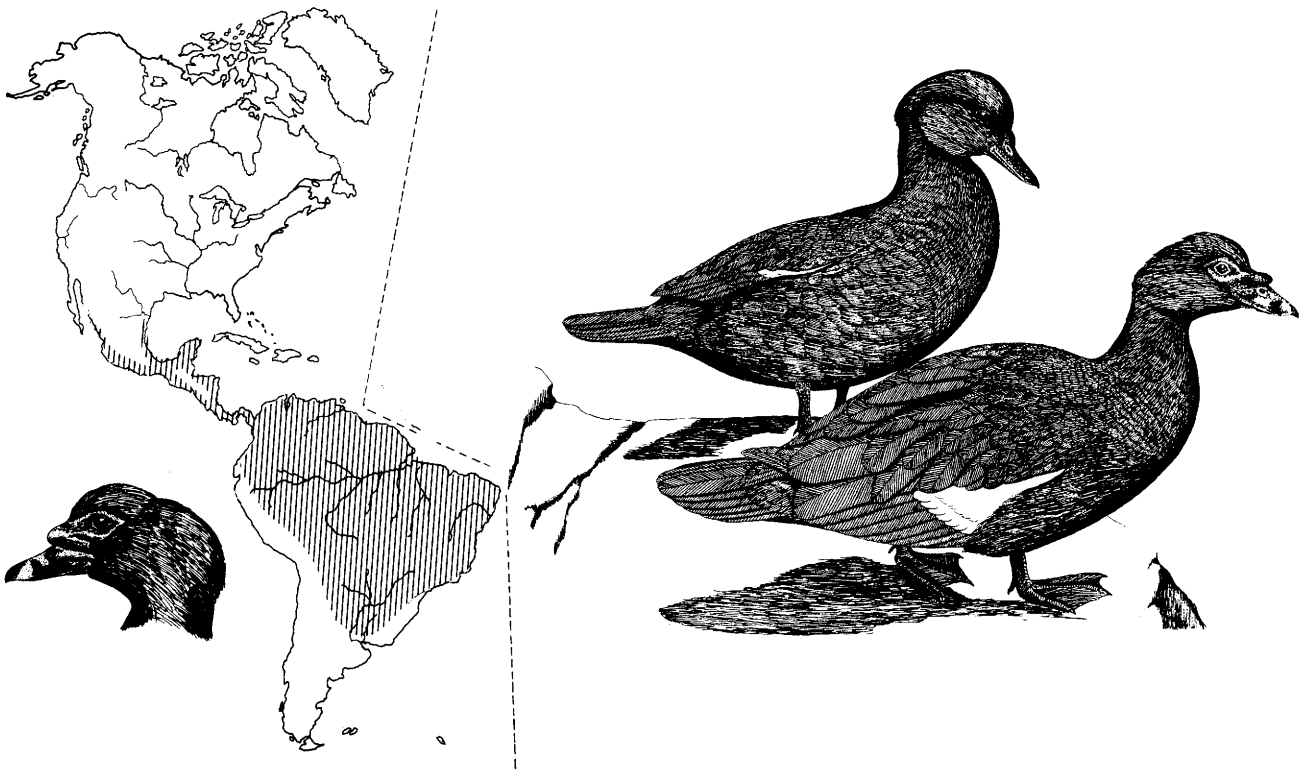
Muscovy Duck

Cairina moschata (Linnaeus) 1758

Other vernacular names. Musky or musk duck; Moschusente (German); canard de Barbarie (French); pato criollo or pato negro (Spanish).

Subspecies and range. No subspecies recognized. Resident from Mexico south to Central America and South America to the coast of Peru on the west and to Santa Fe, Argentina, on the east; accidentally to Buenos Aires. Also a rare resident on Trinidad. See map 49.





MAP 49. Breeding or residential distribution of the muscovy duck.

Measurements and weights. Folded wing: males, 350–400 mm; females, 300–315 mm. Culmen: males, 65–75 mm; females, 50–53 mm. Weights: males, 2.0–4.0 kg (domestic birds may exceed this maximum); females, 1.1–1.5 kg (Leopold, 1959). Eggs: av. 67 x 46 mm, white with greenish sheen, 74 g.

Identification and field marks. Length 26–33″ (66–84 cm). Plate 31. *Adults* are predominantly brownish black to black, with greenish to purplish iridescence on most of the upperparts. The under wing coverts, axillaries, and varying amounts of the upper wing coverts are white (varying with age); the legs and feet are black; and the bill is pinkish with black mottling. The skin around and in front of the eyes is bare and warty, and the base of the bill is enlarged. *Females* are smaller, have an entirely feathered head, and lack the bill enlargement. *Juveniles* are less iridescent dorsally, and have little or no white on their upper wing coverts.

In the field, muscovies are likely to be confused only with comb ducks but lack the white head, breast, and underparts of that species. Muscovy ducks have few vocalizations; the male utters a weak hissing note, and the female has a very simple quacking call.

NATURAL HISTORY

Habitat and foods. The preferred habitats of this tropically adapted species are the rivers, lagoons, marshes, and similar areas of water at relatively low altitudes that are associated with tropical forests or heavy woodland. Slowly flowing rivers, or backwater swamps adjacent to such rivers, are apparently their favorite habitat. During dry seasons the birds may move into coastal swamps and lagoons, but fresh-water environments are their preferred breeding localities. In such areas the birds forage by dabbling or upending, and probably also do some grazing. Not much is known of specific foods taken, but small fish, insects, millepedes, small reptiles, and water plants have been reported. Evidently termites are a favorite food, and it is said that the birds tear

nests apart to get at them. They will also chase crabs, and have been observed feeding on water lily seeds. Seeds of other aquatic plants, such as pickerelweeds (*Pontederiaceae*), and sedges (*Fimbristylis*), and the roots of *Mandioca* have also been reported among their foods.

Social behavior. In general, flocks of muscovies are not large, usually consisting of a half dozen or so. Sometimes larger flocks occur on common roosting sites such as trees, but these groups are not close-knit and upon disturbance usually disperse in all directions. There seems to be no indication that either pair bonds or family bonds are well developed in muscovy ducks. There is also no well-established migratory pattern in the species, which is generally restricted to areas without major seasonal temperature changes. Dry-season movements of a limited nature do occur, but there seems to be no flocking during the postbreeding molt period. The aggressive and sexual displays of muscovy ducks are simple and not differentiated from one another as they are in more typical ducks. The male's only obvious display is a crest-raising, tail-shaking, and back-and-forth head movement while making breathing or hissing sounds. Similarly, the female is relatively lacking in social displays, and apparently lacks even a well-defined inciting behavior. Copulation occurs on water, and usually takes the form of an apparent rape, with the male simply overpowering the much smaller female. However, at times the female may actively solicit copulation by extending herself flat on the water before the male. After treading, there appears to be no display behavior on the part of either sex before the female begins to bathe (Johnsgard, 1965a, 1975).

Reproductive biology. Very little is known of the nesting of this species under natural conditions. Eggs or young have been reported between November and June in Central and South America. Most of these dates seem to conform to the occurrence of the rainy season. They include Bolivia in November, Guayana from February to May, Peru in March, Surinam in March and April, and Panama in June. The usual nest site is a tree hollow, but the birds occasionally nest amid rushes. The clutch size is relatively large, as is typical of hole-nesting waterfowl, and usually ranges between 8 and 15 eggs. But up to as many as 20 eggs have been reported, probably laid by two females. The male plays no apparent role in nest-site selection, nor does he guard the nest or otherwise play any paternal role in assuring its success. The incubation period is 35 days, judging from data on captive birds. Virtually nothing is known of brood-rearing behavior, nor has the fledging period been established (Johnsgard, 1975).

Status. This species is still widespread and abundant over much of South and tropical Central America, where it is an important game species in some areas. It is readily domesticated, and provides natives with an important source of food under these conditions.

Relationships. The genus *Cairina* as recognized here includes the closely related muscovy and white-winged wood ducks; the genera *Sarkidiornis* and *Pteronetta* are obviously also closely related birds and might readily be considered members of this genus when broadly interpreted. These birds, together with the spur-winged goose, collectively make up the generalized "core" of the perching ducks, and the others in the tribe are variably more specialized in their foraging and social behavior patterns (Johnsgard, 1965a).

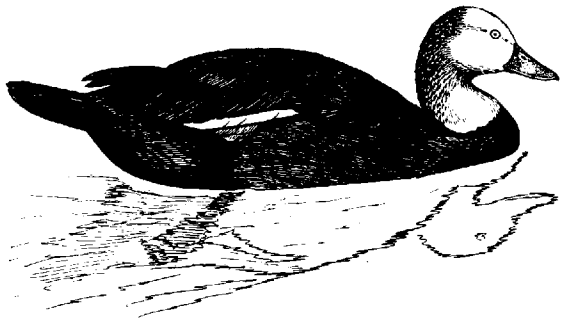
Suggested readings. Leopold, 1959; Johnsgard, 1975.

White-winged Wood Duck

Cairina scutulata (S. Müller) 1842

Other vernacular names. None in general English use. Malaienente (German); canard à ailes blanches (French); pato de alas blancas (Spanish).

Subspecies and range. No subspecies recognized. Resident in Assam, especially in the North East Frontier tracts (Arunachal Pradesh), Manipur, Bangladesh, and Burma. Locally south through the Malay Peninsula to Sumatra and Java. Rare throughout its range and probably endangered. See map 50.



Measurements and weights. Folded wing: males, 360–400 mm; females, 305–55 mm. Culmen: males, 58–66 mm; females, 51–61 mm. Weights: males, 2,945–3,855 g; females, 1,925–3,050 g. Eggs: 62 x 45 mm, greenish yellow, 89 g.

Identification and field marks. Length 26–32″ (66–81 cm). *Adults* have a white or black and white spotted head, with the white usually terminating at the upper breast but at times extending to the abdomen. The rest of the body is chestnut brown and blackish with green iridescence. The tail and primaries are brownish black, while the axillaries, under wing coverts, and upper wing coverts other than the greater secondary coverts are white. The latter coverts are black and the secondaries are mostly bluish gray, while the first adjacent tertial is striped with black and white. The iris color of adult males is yellow. The legs, feet, and bill are yellow to orange, the bill reportedly being swollen at the base and reddish during the breeding season. *Females* are more heavily spotted with blackish coloration on the head, and are considerably smaller than males. They also have brownish eyes. *Immatures* are duller and browner, and lack iridescence on their dorsal feathers.

In the field, the white wing coverts and dark underparts distinguish it from the comb duck of the same general region. Loud, single-syllable calls are typical of both sexes; that of the female is a honking sound reminiscent of a rusty pump in need of oiling.

Natural History

Habitat and foods. Marshy swamps and lakes surrounded by extensive jungle, and smaller patches of

Map 50. Known current (inked) and presumptive original (hatched) ranges of the white-winged wood duck.

jungle containing pools of water are the preferred habitat of this species. The birds evidently avoid moving waters, and also disappear when human activities encroach on the jungle environment. Waterlogged depressions in tropical evergreen forest, especially with dead trees in the water, are often used, as are jheels in dense canebrakes and tall elephant grass jungle (Ali & Ripley, 1968). Foods taken by this species are little known, but apparently include snails, some small fishes, and rice. In captivity the birds eat a variety of foods, including grain, water plants, and various greens.

Social behavior. There is no indication of a strong flocking tendency in these birds. Usually they are to be found in pairs or small groups (families?) of 5 or 6 birds on small ponds. Larger numbers seen have included a flock of 11 and two parties totaling 30 birds. The birds spend most of the daylight hours perching in trees and toward dusk fly to rice fields, open waters, and marshes to forage at night, returning again at dawn. There are no known migrations.

Reproductive biology. Almost no nests have ever been located, but one was found in a tree standing beside a stream. The nest was in a decaying hollow at the first major branching some six meters up. The birds reportedly sometimes nest on the ground or on masses of branches in trees, presumably the deserted nest of another species. The probable clutch size is about 10 eggs, ranging from 6 to 13 in captivity. Records of captives indicate that the incubation period is 33 to 35 days. Probably the female performs all incubation and brood-rearing duties, judging from what is known of related species, but pair bonds are present and the male may remain with the family (Mackenzie & Kear, 1976).

Status. As of 1970, the species was very rare and decreasing in Assam, but was still present in Manipur, Bangladesh, and upper Burma. Its current status is uncertain, but the birds were once thought to be widely distributed in Thailand and Vietnam. It has recently been reported for the first time from central Laos (Ripley, in Hyde, 1974). Mackenzie and Kear (1976) discuss its past and present status, and indicate that although firm data are lacking, the species may still exist on Sumatra, Java, and Malaya but has not been seen for more than 17 years in Thailand. It has recently been observed in central and southern Sumatra, where it may still be fairly common, at least in Lampung Province (*Wildfowl* 28: 61–64).

Relationships. Anatomical similarities indicate that this species is a fairly close relative of the muscovy duck, and probably also of the Hartlaub duck, both of which are similar in their ecology and behavior.

Suggested readings. Ali & Ripley, 1968; Mackenzie & Kear, 1976.

Comb Duck

Sarkidiornis melanotos (Pennant) 1769

Other vernacular names. Knob-billed duck, knob-billed goose; nukhta (Indian); Höckerglanzente (German); sarcidiorne (French); pato arrocero (Spanish).

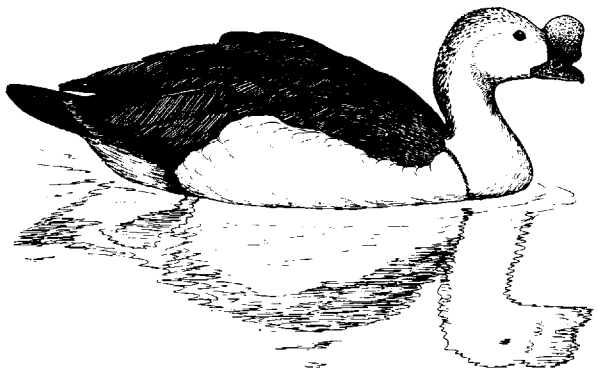
Subspecies and ranges. (See map 51.)

S. m. melanotos: Old World comb duck. Resident in Africa from Gambia and the Sudan south to the Cape, Madagascar, India, Burma, Thailand, Laos, and southeastern China.

S. m. sylvicola: South American comb duck. Resident in eastern Panama, Trinidad, and South America from Colombia and Venezuela southward east of the Andes to northern Argentina.

Measurements and weights. Folded wing: males, 350–80 mm; females, 305–55 mm. Culmen (from back of caruncle): males, 57–66 mm; females, 42–52 mm. Weights: males, 1,300–2,610 g; females, 1,230–2,325 g. Eggs: av. 62 x 43 mm, pale cream, 47 g.

Identification and field marks. Length 22–30″ (56–76 cm). Plate 29. *Adults* have a black and white spotted head and neck, and an entirely white breast and abdomen. The flanks are pale gray (*melanotos*) or blackish (*sylvicola*), while the scapulars, back, tail, and inner secondary feathers (tertials) are iridescent green to purple. The secondaries are bronzy green, as are most of the upper wing coverts, while the primaries and under wing coverts are blackish. The under tail coverts are white, tinged during the breeding season with yellow, which also seasonally appears on the rear of the head and neck. The bill, legs, and feet are grayish black, and males have a fleshy caruncle at the base of the bill that is largest during the breeding season. *Females* are appreciably smaller and lack the enlarged bill and yellow on the head and under tail coverts. *Immatures* resemble



females but are less glossy above and are heavily barred with blackish on the back of the neck. *Juveniles* have a distinctive, an entirely brownish plumage that somewhat resembles that of a female Australian wood duck.

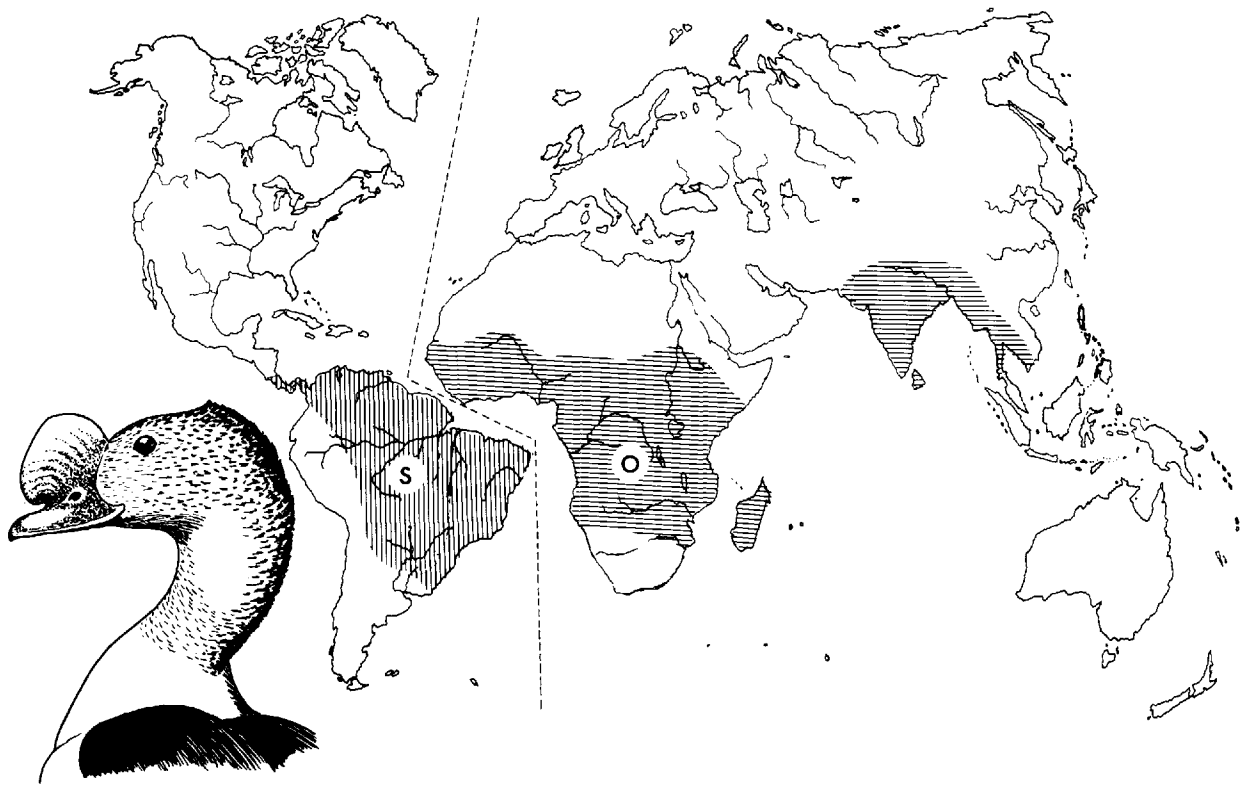
In the field, comb ducks are most likely to be confused with muscovy ducks or with white-winged wood ducks, but its white breast and abdomen separate the comb duck from those species, and the *Cairina* species also have conspicuous white wing coverts when in flight. Vocalizations, which are very weak, include a faint *churrr* sound in the males and a very weak quack by females.

Natural History

Habitat and foods. This is a bird typically found in waters associated with open woodlands rather than heavy forests, such as grassy ponds or lakes in savannah country and open woodlands along some of the larger rivers and occasionally very large lakes. In the breeding season it is sometimes found in grassland areas, but prefers areas where trees or other perching sites are readily available. The birds also spend time on sandbars, muddy flats, or similar areas during the middle of the day, and restrict their foraging largely to early morning and late afternoon. They are primarily vegetarians, and may be pests in areas where corn, oats, and similar grains are planted, as they often graze on seedlings of these grasses. Other grasses and grass seeds, the soft parts of aquatic plants, and some invertebrates such as insect larvae and adult locusts have been found in their stomachs (Clancey, 1967).

Social behavior. The social groupings of this bird include pairs, males with several females, small parties of a single sex, and sometimes also fairly large flocks, especially outside of the breeding season. In some areas of Zambia the birds arrive by the thousands during the rainy period for breeding but are gone during the dry season, while in southernmost South Africa they are present during the nonbreeding season. The birds move considerable distances as the rainfall pattern dictates; one individual banded in Rhodesia was later taken 2,150 miles to the north in the Sudan. However, no clear-cut migratory patterns are yet evident. In many areas the breeding season is greatly prolonged, and in such cases the birds probably never move far from their breeding areas. Pair bonding is evidently quite weak or even absent in this species, and the period of time to reproductive maturity has apparently not been firmly established. During much of the year the females seem to avoid males, and even during the period of courtship the females may flee when approached by displaying males, which at that time are highly aggressive toward other males. The major aggressive display is head-pumping movement performed while swimming in a very high and erect posture and accompanied by a weak *churrr* sound. The typical display toward females usually occurs on land, and is begun by a slow wing-flapping display, followed by display-preening on the breast and behind the wing. There does not appear to be an inciting display by females, which seems understandable in view of the apparent absence of pair bonds (Johnsgard, 1965a). In several observations of copulation that I have recently made, the male approached the female with repeated head-pumping and drinking movements alternated with gaping and hissing with a diagonally outstretched neck. The female sometimes performed slight head pumping and assumed a prone posture, and at other times attempted to escape by diving, whereupon she would be chased and usually caught by the male. After treading, the male typically held the female's nape for several seconds as he held his wings slightly spread in the usual display posture. After releasing the female, the male shook its tail and swam in a circle around her while in this display posture, then finally bathed and flapped its wings.

Reproductive biology. The breeding season is generally associated with the rainy season. In India, it occurs during the monsoon period, mainly from July to September. Ceylon records of breeding are for February and March. In Zambia, records extend from November to March, but the great majority are for January and February. Most west African records



MAP 51. Breeding or residential distributions of the South American ("S") and Old World ("O") comb ducks.

are for August and September, but relatively little is known of its breeding times in the northern and western parts of its African range. Likewise, almost nothing is known of breeding periods in South America. A variety of nesting sites are reportedly used, and ground locations are said to be used more commonly than tree hollows. Tall grass cover near water, rocky hills, and hollows of trees or stumps have all been found as nesting sites. Tree hollows seem to be used more frequently in India and South Africa than in northern parts of Africa; mango and banyan trees are said to be especially favored. Some observers have reported seeing both sexes together on nest-site searches, which casts doubt on the idea that pair bonding is essentially absent in comb ducks. As in other tree-nesting ducks, clutch sizes seem to be fairly large and are often further inflated by dump-nesting tendencies. Records from captivity suggest a normal clutch range of 8 to 12 eggs, and an incubation period of 30 days (Johnstone, 1970). Incubation is the sole responsibility of the female. There is no indication that more than one brood is raised per year, even where breeding seasons are prolonged (Clancey, 1967).

Status. This species is apparently still common over most of its range and in general is not highly sought by sportsmen because of its poor palatability. It is apparently now extirpated in Ceylon, where at one time it was a resident (Ali & Ripley, 1968).

Relationships. Most of the morphological evidence suggests that this species is closely related to *Cairina*, but Woolfenden (1961) found a number of unique skeletal features that he felt deserve separation from all other perching ducks. Perhaps *Sarkidiornis* represents the best living link between the more primitive perching ducks previously considered and the more specialized forms such as *Chenonetta* and *Nettapus*.

Suggested readings. Clancey, 1967; Ali & Ripley, 1968.

Hartlaub Duck

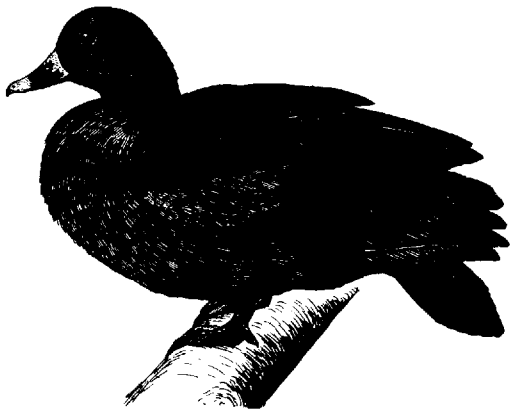
Pteronetta hartlaubi (Cassin) 1859

Other vernacular names. Hartlaub's teal; Hartlaubsente (German); canard de Hartlaub (French); pato de Hartlaub (Spanish).

Subspecies and ranges. No subspecies recognized here (*albifrons* is sometimes recognized as an eastern race). Resident from Guinea west to Zaire and southwestern Sudan. See map 52.

Measurements and weights. Folded wing: males, 263–82 mm; females, 248–66 mm. Culmen: males, 46–50 mm; females, 44–48 mm. Weights: both sexes, 800–940 g. Eggs: av. 55 x 42 mm, cream, 51 g.

Identification and field marks. Length 22–23″ (56–58 cm). Plate 32. The *adult male* has a head that is black except for a variably large white area behind the bill (sometimes extending to the nape and chin) and a body that is almost uniformly rich chestnut brown. The tail and rump are olive brown, as is the upper wing surface except for the upper coverts, which are bluish gray. The bill is black, and is seasonally enlarged at the base, with pale pink to yellowish markings near the tip and below each nostril. The legs and feet are dusky brown. *Females* closely resemble males, but the bill is not enlarged basally and the pale markings are pinkish gray rather than yellow. *Juveniles* have straw-colored tips on the breast and abdominal feathers.



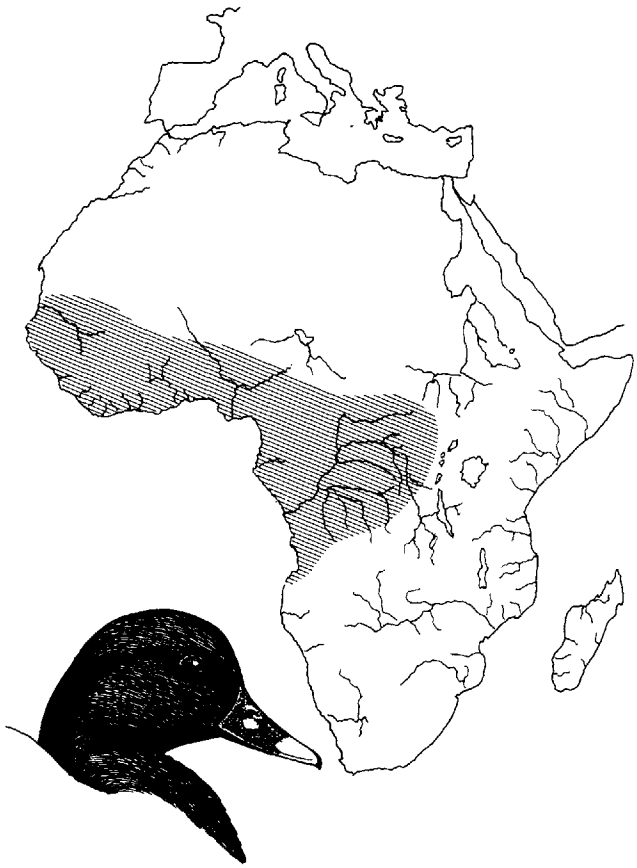
In the field, no other species of forest-inhabiting duck in Africa is predominantly chestnut-colored. Females have a loud quacking call that is uttered frequently, and males produce a quiet, high-pitched wheezing noise. The bluish upper wing coverts are no doubt evident in flight, but unlike those of *Cairina,* the under wing coverts are brown.

Natural History

Habitat and foods. Throughout the year the Hartlaub duck is found in the rain forests and adjacent gallery forests of western Africa. Small forest brooks that may be hidden beneath the adjoining trees, rather than large rivers, are the birds' favored habitats, and they spend a good deal of time perching in the trees. Not a great deal is known of their foods, but a small sample contained such food items as aquatic insect larvae (mainly dragonflies), freshwater snails, small bivalve mollusks, shrimps, a spider, and many small seeds. It has been reported that the ducks also eat the roots of cassava that are placed by natives in streams for soaking (Chapin, 1932).

Social behavior. Generally this species has been reported in pairs and very small groups, with 15 being about the largest number ever reported in a flock. It seems likely that the breeding season is greatly extended, and thus the breeding birds are likely to remain in or near their territories throughout the year. At least, no migrations or marked seasonal changes of abundance have yet been noted. What little flocking has been noted occurred on the open waters of some larger rivers and presumably was done by molting birds. The time of nesting is still poorly known. Eggs or broods have been reported in September in the Sudan and November in Cameroon, apparently coinciding with the wet season.

Reproductive biology. Evidently no nests have yet been found in the wild, but the birds presumably nest in tree hollows. The first attempted nesting in captivity occurred in 1958 at the Wildfowl Trust, and a second attempt in 1959 was successful. In 1958 three clutches totaling 24 eggs were laid, while in 1959 a clutch of 9 was produced. Only the female incubated, and the incubation period was established to be 32 days. Both sexes were very aggressive in the defense



MAP 52. Breeding or residential distribution of the Hartlaub duck.

of their brood; in this respect the Hartlaub duck seems to differ strongly from *Cairina*. However, after the ducklings became fully feathered at eight weeks of age, the male began to threaten them, which is of interest considering the absence of a well-defined juvenile plumage in this species.

Status. The true status of this rain forest bird is hard to judge, owing to its inaccessible habitat. No doubt it will survive only as long as these rain forests remain relatively undisturbed.

Relationships. Although often included in the genus *Cairina*, the numerous plumage and behavior differences present in this species seem to warrant the retention of a monotypic genus for it (Johnsgard, 1965a). The skeleton of this species also shows a number of peculiarities that suggest generic distinction (Woolfenden, 1961).

Suggested readings. Chapin, 1932; Phillips, 1923–26.

Green Pygmy Goose

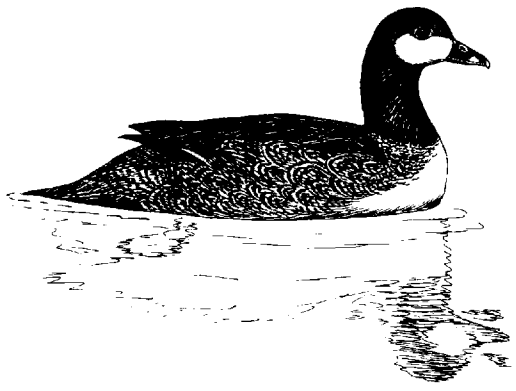
Nettapus pulchellus Gould 1842

Other vernacular names. Green goose; Grüne Zwergglanzente (German); sarcelle pygmée d'Australie (French); ganso pigmeo verde (Spanish).

Subspecies and range. No subspecies recognized. Resident in Ceram, Buru, southern New Guinea, and northern Australia from the Fitzroy River to Rockhampton, Queensland. See map 53.

Measurements and weights. Folded wing: males, 160–80 mm; females, 150–80 mm. Culmen: males, 23–28 mm; females, 21–29 mm. Weight: males, 300–430 g (av. 310 g); females, 245–340 g (av. 304 g). Eggs: 44 x 32 mm, creamy white, 30 g.

Identification and field marks. Length 13″ (33 cm). *Adults* have a brown and iridescent green crown, while the cheeks and throat are white (some birds have a gray mark extending below the eyes). The nape and neck are also green, and the green extends posteriorly over the mantle and scapulars to the tail coverts, which are finely barred greenish black and white. The upper breast and flanks are broadly barred with white and dark green or brown, and the lower breast and abdomen are white. The tail and wing are mostly blackish, except that the secondaries are mostly white, forming a conspicuous speculum. The bill is mostly grayish black except underneath and at the nail, where it is pinkish, and the legs and feet are greenish gray. *Females* are slightly smaller and duller than males, with less distinctive flank barring, and the green of the neck is not continuous around the front. *Immatures* initially resemble females, but are heavily spotted with brown on the face, chin, and neck.



In the field, this species is most likely to be confused with the cotton pygmy goose, but that species lacks barred flanks and has a white or mostly white nape and hind neck. Both sexes of pygmy geese have relatively high-pitched calls, which may be shrill or pure whistling sounds.

Natural History

Habitat and foods. In Australia, the favorite habitats of this species are tropical lagoons covered with water lilies and submerged aquatic vegetation. These are typically permanent and fresh-water areas in coastal or subcoastal regions. During the dry season the birds are more widespread, and sometimes gather in considerable numbers on some larger lakes where water lilies are scarce or absent. Streams, shallow pools, and brackish waters are avoided. In New Guinea, where the swamps are often greatly overgrown with emergent vegetation, the birds are more often found in the open and deeper parts of such waters. The favored food wherever it is available is the water lily; budding flower heads and seeds of lilies are avidly eaten whenever they are present. When lilies are not present, the birds make shallow dives to obtain leafy materials of such aquatic plants as muskgrass and pondweeds, or they may swim near shore to strip the seed heads of shoreline grasses, especially wild millet (*Echinochloa*). Virtually no animal materials are consumed except those that might be ingested by accident (Frith, 1967).

Social behavior. Throughout the year these small ducks are found in pairs or in small groups that may represent family units. The pair bond is obviously strong, and Frith (1967) suggests that it may be per-

MAP 53. Primary (cross-hatched) and peripheral (hatched) breeding or residential distributions of the green pygmy goose.

manent, since males have been seen evicting other males from the vicinity of their mates at all times of the year. Males also strongly defend small feeding areas, and in spite of their size fight frequently. Seasonal movements are evidently on a very small scale and are associated with the availability of foraging areas during the dry season. Some dry-season refuges, such as the East Alligator and Adelaide rivers, may support several hundred birds seasonally. Breeding is evidently timed to coincide with the wet season, when the highest water levels are just past and the lagoons are either at their maximum size or are starting to decline again. Thus, sexual displays begin about October, at the onset of the rains, so that nesting can get underway by January. Courtship displays of the male are still only poorly known but appear to be surprisingly simple, consisting of neck stretching, preening the wing, and head turning. Copulatory behavior has not yet been described (Frith, 1967).

Reproductive biology. Near Darwin, the nesting season probably extends from January until March, and is no doubt preceded by territorial occupancy and defense by the male. The male also reportedly takes the initiative in searching for nest sites by flying up into trees and sitting near hollows. These are then examined by the female, who may visit several potential sites before settling on one of them. The usual clutch size is still uncertain, but probably ranges between 8 and 12. Likewise, the incubation period has not been established yet. It is known that the male remains on the territory through the incubation period and rejoins his mate and the brood at the time of hatching. They spend the daylight hours in fairly deep water, but forage in the shallows in early morning and late afternoon. In deep water, ducklings have been observed to dive well for food, and they also dive when disturbed, presumably coming up under water lily leaves. When swimming away from danger, the female takes the lead and the male follows behind the brood (Frith, 1967).

Status. According to Frith, this species is not numerous anywhere, but is common in favored habitats of its restricted range. Since the heart of its range is not now in any danger of development or destruction, the species appears to be relatively safe.

Relationships. The genus *Nettapus* is obviously fairly closely related to *Chenonetta*, judging from their downy plumage patterns, but the bill-shape similarities of these two genera are quite possibly the result of convergent evolution. A number of skeletal similarities also exist between *Nettapus* and *Chenonetta* that suggest close relationships (Woolfenden, 1961).

Suggested readings. Frith, 1967.

Cotton Pygmy Goose

Nettapus coromandelianus (Gmelin) 1798

Other vernacular names. Cotton teal, white pygmy goose, white-quilled pygmy goose; Zwergglanzente (German); sarcelle de Coromandel (French); ganso pigmeo de la India (Spanish).

Subspecies and ranges. (See map 54.)

N. c. coromandelianus: Indian pygmy goose. Resident in India, Ceylon, and Burma east to southern China, south to the Malay Peninsula and the Indo-Chinese countries, northern Luzon, Borneo, Sumatra, Java, northern Celebes, and northern New Guinea.

N. c. albipennis: Australian pygmy goose. Resident in eastern Australia, mostly between Cape Melville and Cape Townsend.

Measurements and weights. Folded wing: males, 172–88 mm; females, 161–86 mm. Culmen: males, 25–26 mm; females, 23–26 mm. Weights: males, 311–430 g (av. 403 g); females, 255–439 g (av. 380 g). Eggs: 47 x 35 mm, creamy white, 27 g.

Identification and field marks. Length 13″ (33 cm). *Adult males* in breeding plumage have a blackish crown and a narrow black eye-ring, while the rest of the head, neck, breast, and underparts are white, except for a narrow breast band of black. The back and scapulars are iridescent green, while the flanks and tail coverts are peppered with black and white and the tail is black. The upper and lower surfaces of the wings are dark except for a large white speculum formed by the tips of the secondaries and a subterminal band across the primaries. The iris is red, and the legs, feet, and bill are blackish. *Males in nonbreeding plumage* resemble females but have a more extensive white wing speculum. *Females* have a brown iris, lack a breast band, and exhibit less irides-

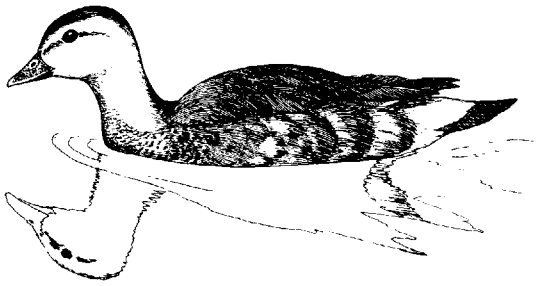
cent color dorsally. *Immatures* resemble females, but have no iridescence and have a more distinct dark stripe through the eye.

In the field, this tiny duck could be confused only with the green pygmy goose where these species overlap, and differs from it in having unbarred flanks, more extensive white on the wings (extending to the primaries), and a unicolored white or gray rather than bicolored hind neck and cheek pattern. When in flight, this species utters series of rapid staccato cackling notes sounding like "Fix bayonets, fix bayonets," while green pygmy geese produce a continuous chirrup sound. The female is said to also have a soft quacking note, but the vocalizations of this species are only poorly known.

Natural History

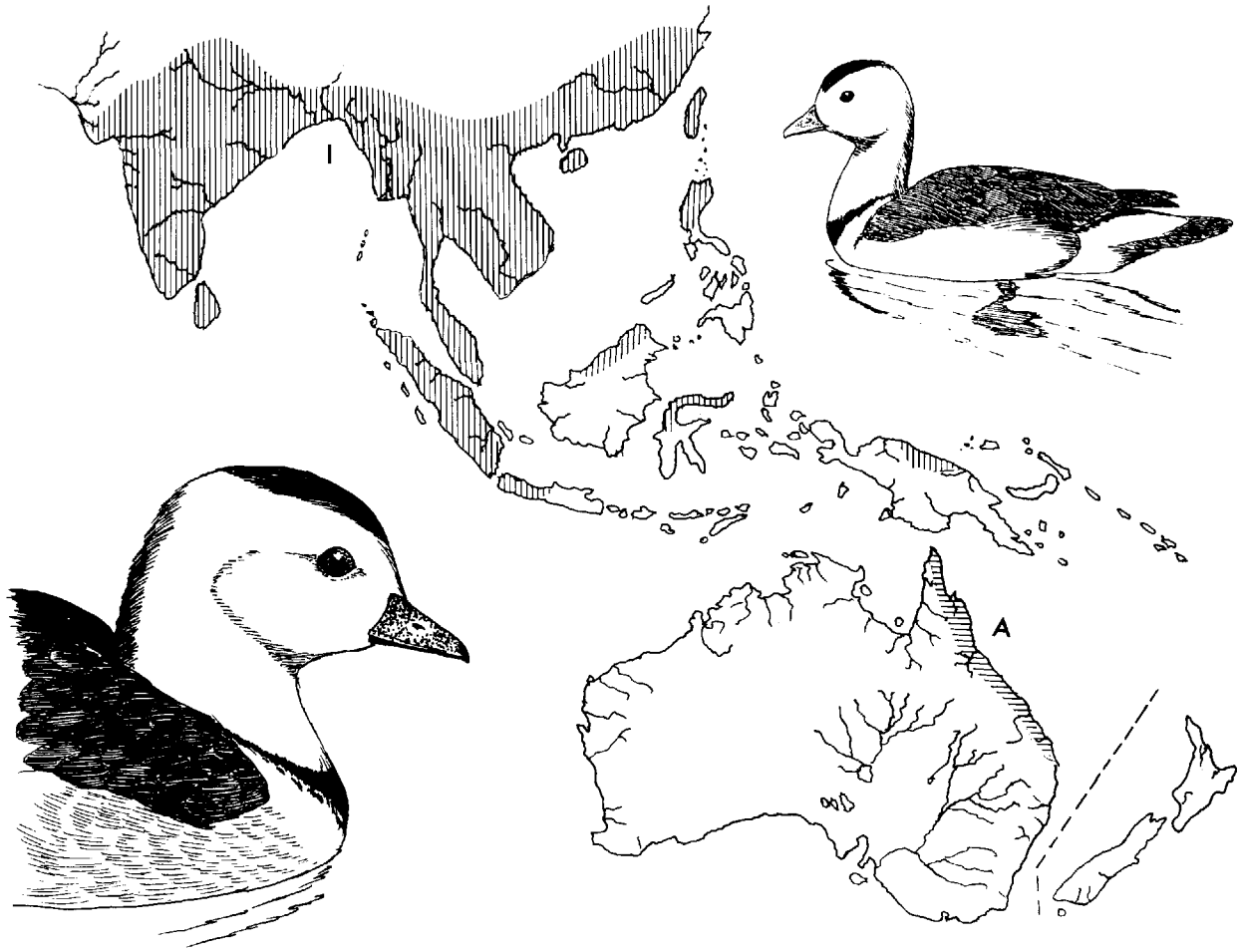
Habitat and foods. In Australia this species primarily inhabits deep lagoons that are associated with rivers and creeks in the tropical coastal regions, or similar fresh-water ponds that are well vegetated with water lilies and various other submerged and floating-leaf aquatic plants. In India it likewise favors lagoons, jheels, and ponds that are extensively vegetated. Sometimes lakes are also used, as are swamps and creeks, depending on the nature of their associated plant life. Swamps and creeks are largely wet-season habitats, while rivers and lakes are utilized primarily during the latter part of the dry season. In spite of the similarities in their bill shapes, the cotton pygmy goose and green pygmy goose seem to have marked differences in food preferences, with the water lilies being of little importance to the former, which prefers pondweeds, hydrilla (*Hydrilla*), and the seeds of aquatic and shoreline grasses. In neither species are insects or other animal foods of substantive significance (Frith, 1967).

Social behavior. In India this species is usually to be found in pairs during the breeding season but occurs in small flocks at other times, and on rare occasions has been seen in numbers of up to as many as 500 birds (Ali & Ripley, 1968). In Australia, dry-season concentrations of up to several hundred birds occur in a few areas such as near Townsville, but again, most observations are of pairs or small groups. There are some regular seasonal movements in Australia associated with seasonal variations in water, but the distances and number of birds involved are apparently small in comparison with some of the nomadic



and more mobile species. Definite seasonal migrations are more typical on the Asian continent, especially at the northern part of the range in China. Little has been recorded on the time of pair formation or the nature of the pair bond in this species, but it is assumed that pair bonds are well developed, as in the other pygmy geese. Likewise, courtship displays have not been adequately described. One early observer reported a male arching his neck and jerking open his wings to expose the white patch, but it seems probable that the displays are more complex and varied than this. The precopulatory behavior consists of mutual bill dipping while the birds face each other, and the male attempts to mount the female. The probable major postcopulatory display consists of the male arching his neck, partially spreading his folded wings, and turning to face the bathing female (Johnsgard, 1965a).

Reproductive biology. In northern India, the breeding season extends from June to September, coinciding with the wet season, but is concentrated in July and August, while in Ceylon it occurs from February to August (Ali & Ripley, 1968). In Australia the breeding period is mainly from January to March, or during the latter half of the wet season (Frith, 1967). Tree hollows are evidently the preferred nesting sites in most or all parts of the range, but a variety of other elevated locations have been used. These include holes in buildings or other man-made structures. As with the green pygmy geese, males typically help their mates search for suitable sites, remaining on nearby branches as the female inspects each prospective hollow. The nest is often from 2 to 5 meters above the ground, and may be as high as 20 meters. The clutch size is variable and generally estimated to range from about 6 or 8 to 14 or 15 eggs. As in the green pygmy goose, the incubation period is unknown; an early estimate of 15 or 16 days is obviously erroneous. Very probably only the female incubates, and the possible role of the male in brood care is still not clear. The raising of two broods



MAP 54. Breeding or residential ranges of the Australian ("A") and Indian ("I") cotton pygmy geese.

per year has been suggested for Ceylon and also for the lower Yangtze Valley but has not been confirmed (Phillips, 1923–26).

Status. Over much of its range this species is still very common, although very locally distributed, as is the case in India, Burma, and Ceylon. It is uncommon on the Malay Peninsula, and its status in Thailand and Vietnam is unknown. It seems to be quite local and fairly rare over the East Indian islands on which it occurs, and in Australia it is largely limited to a small part of Queensland. The Australian race is thus the most vulnerable to possible loss, and its status there should be closely monitored (Frith, 1967).

Relationships. The relationships within the genus *Nettapus* are not very obvious; all three species seem to be fairly distinct from one another. This is the most widespread species, and the only one that shows marked seasonal differences in male plumage patterns. The female's plumage shows some similarities to that of the *Sarkidiornis* female, and a general similarity in proportions to *Chenonetta* is also evident among pygmy geese.

Suggested readings. Ali & Ripley, 1968; Frith, 1967, Phillips, 1922–26.

African Pygmy Goose

Nettapus auritus (Boddaert) 1783

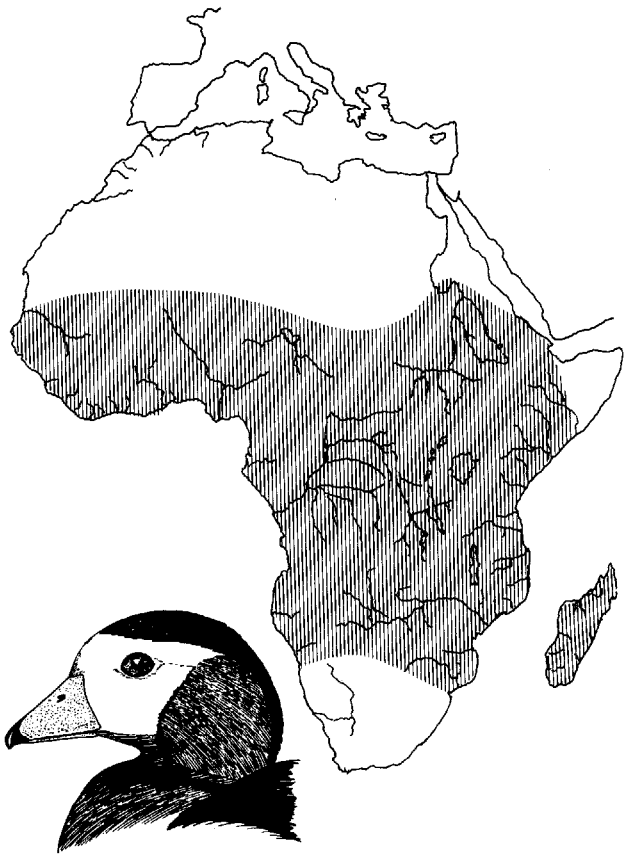
Other vernacular names. Dwarf goose; Afrikanische Zwergglanzente (German); sarcelle pygmée d'Afrique (French); ganse pigmeo africano (Spanish).

Subspecies and range. No subspecies recognized. Resident in Africa from Senegal and Ethiopia south to the Cape, and on Madagascar. See map 55.

Measurements and weights. Folded wing: males, 150–65 mm; females, 142–58 mm. Culmen: males, 25–27 mm; females, 23–25 mm. Weights: males, 285 g (Kolbe, 1972); females, 260 g (Lack, 1968). Eggs: 43 x 33 mm, creamy white, 23 g.

Identification and field marks. Length 11–12″ (28–30 cm). Plate 33. *Adult males* have a white face and foreneck bounded behind with iridescent greenish black on the crown and an oval sea-green patch on the side of the neck and head that is bordered in front by black. The breast and flanks are tawny brown, the abdomen is white, and the scapulars and back are greenish black, while the tail and tail coverts are blackish. The wing is mostly black to greenish black, except for the secondaries, which become progressively more tipped with white from the inside out, until the outermost ones are entirely white on the exposed vanes. The bill is yellow, with a black nail, and the iris is brown or reddish. *Females* resemble males but lack the distinctive green and white facial pattern, and instead are mostly grayish on the head, with a dark eye-stripe and darker crown and hind neck. The bill is also duller yellow. *Immatures* are like the adult female, but have a more distinct eye-stripe and are buffier on the breast and flanks.

In the field, this duck's tiny size and brownish breast and flank coloration set it apart from all other African waterfowl. It is relatively silent, but the male produces several high-pitched whistling or twittering sounds, and the female utters a weak quack.



MAP 55. Breeding or residential range of the African pygmy goose.

NATURAL HISTORY

Habitat and foods. In Africa this species is found on quiet backwaters of slowly flowing rivers, on shallow bays of lakes, and on marshes and swamps wherever there is an ample growth of water lilies (*Nymphaea*) and associated aquatic plants. Like that of the green pygmy goose, its distribution probably closely coincides with the distribution of water lilies. What little is known of its foods indicates that the seeds and other parts of water lilies are its primary items of diet. No doubt other aquatic plants are also consumed at times, and reportedly even some aquatic insects and their larvae are eaten, but these must be only secondary foods. The birds are known to forage during the daylight hours, and are able to dive very well during foraging or when escaping from danger.

They also perch well, and usually roost on partially submerged trees (Clancey, 1967).

Social behavior. Most accounts indicate that these birds are normally found in pairs or at most in small groups. Flocks numbering in the hundreds have been reported from near Freetown, in Sierra Leone. There are some movements associated with rainfall patterns, but in general the birds are fairly sedentary. Pair-bond patterns are not well understood, but in general appear to be well developed. Courtship displays are likewise almost wholly undescribed, and one of the few available descriptions suggests that the male swims "proudly" near the female, exposing his colorful head pattern to her view. Alder (1963) states that when displaying to its mate on land, the male holds its bill well down on its breast and utters a musical *chip, chip, chirrup, chiroo,* in a songlike manner. The female responds to this "song" with a sharper, twittering whistle while bobbing her head up and down. The same call and head movement are made when her mate returns from repelling an intruder.

Reproductive biology. The time of breeding in this species appears to be quite variable. In Madagascar it is during February and March, and on Pemba Island (off Tanzania) it is July and August. Records for Zambia range from September to March, but are concentrated in January and February, and Uganda's records are for February and March, as well as July to October. Breeding probably takes place in Nigeria in August and September, and in the southern Congo from July to October. Nests are usually in hollow trees, but have also been reported in cliff holes, termite hills, and even in the thatched roof of a hut. The birds are also reported sometimes to use the old nests of hammerhead storks (*Scopus umbretta*). Elevated nests may be as high as 20 meters above the ground, and on the other hand, the bird has been found nesting on a river bank in a thick clump of grass (Clancey, 1967). The clutch size ranges from about 6 to 12 eggs. So far as is known, the male plays no role in incubation, which has recently been determined to require 23½ to 24 days (Zaloumis, 1976). However, the fledging period and the possible role of the male in brood care are still unknown.

Status. Over much of its range this species is of local or sporadic occurrence; it is fairly common in Mozambique, northern Botswana, and Zambia. Although regarded as excellent table fare, its small size makes it unimportant as a game species.

Relationships. See the preceding two accounts for comments on evolutionary relationships.

Suggested readings. Clancey, 1967.

Ringed Teal

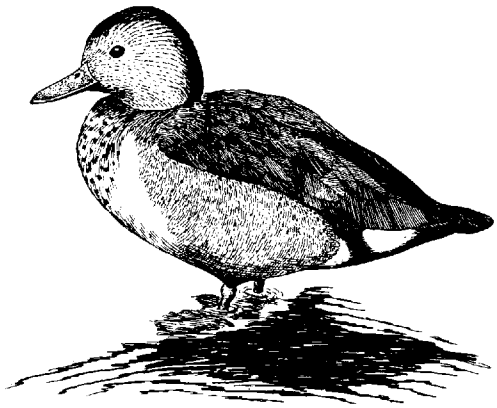
Callonetta leucophrys (Vieillot) 1816

Other vernacular names. Ring-necked teal, red-shouldered teal; Rotschulterente (German); sarcelle à collier (French); cerceta di collar (Spanish).

Subspecies and range. No subspecies recognized. Ranges from eastern Bolivia, Paraguay, and southwestern and southern Brazil to northwestern Argentina and Uruguay, but known to breed only in northwestern Argentina and Paraguay. See map 56.

Measurements and weights. Folded wing: males, 165–70 mm; females, 160–75 mm. Culmen: males, 36–37 mm; females, 34–36 mm. Weights: males, 190–360 g; females, 197–310 g (Weller, 1968a; Kolbe, 1972). Eggs: 45 x 36 mm, white, 32 g.

Identification and field marks. Length 14–15″ (35–38 cm). Plate 34. *Males* have a finely streaked gray head, with a black stripe from the crown over the hind neck, and extending forward over the base of the neck to form a half ring. The breast is buffy pink with small black spots, the abdomen and sides are gray, the latter finely vermiculated with black, and the dorsal surface is olive brown centrally and chestnut brown laterally. The rump, tail, and tail coverts are black except for a white patch on the sides of the rump, and the wings are mostly black except for a white oval formed by the secondary coverts and iridescent green secondaries. The legs and feet are pink and the bill is gray. *Females* are quite different, with a mottled gray, buff, and brown pattern that lacks vermiculations. The head is brown, with a buffy white streak above the eyes and white cheeks and throat except for a brownish "fingerprint" in the ear region. The breast and flanks are mottled and barred with brown and gray, and the upperparts are generally olive brown. The wing is like that of the male. *Immature males* resemble females but lack a distinctive facial pattern and barred flanks. *Immature females* very closely resemble adult females.

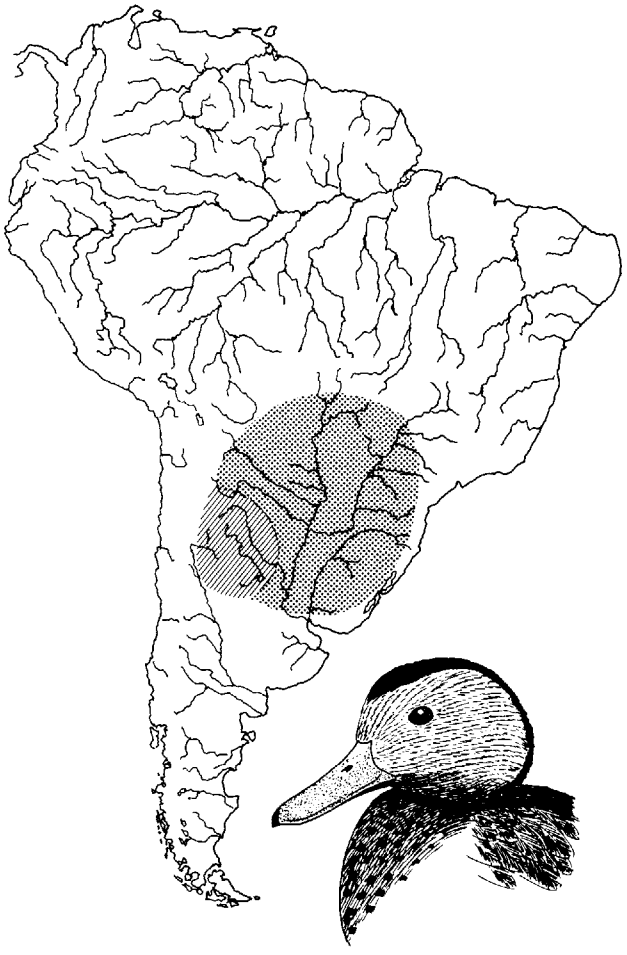


In the field, the small size, perching tendencies, and distinctive green and white speculum should serve to identify this species. The Brazilian teal is much the same size and also perches, but its speculum has the white portion behind the green, rather than ahead of the green, as in this species. The usual call of the male is a soft, wheezy whistle, *wheee'-ooo,* and is apparently used only in courtship. The female's loudest call is a sharp, catlike *hou-iii* that rises sharply in pitch. Their wings produce a whistling noise in flight.

Natural History

Habitat and foods. Little is known of this species' ecology, but it inhabits tropical, mostly forested country, sometimes being found on isolated forest ponds or brooks. However, its preferred habitat seems to be periodically flooded areas that are covered with cutgrass (*Zizaniopsis*) and marshes surrounded by xerophytic forests (Olrog, 1968). It perches very well, and when foraging spends all of its time swimming in shallow water, picking objects from the surface or dipping its head below water. I have never observed it diving for food, and the bill shape suggests that small aquatic seeds are likely to be the major food.

Social behavior. Although social behavior has not yet been studied under natural conditions, observations on captive birds suggest that pair bonds in the ringed teal are strong and probably relatively permanent. The birds are fairly migratory, and move northward several hundred miles into southern Brazil during the nonbreeding season. Flock sizes at this time do not seem to have been noted. During flood years, the birds sometimes reach as far east as Cape San Antonio, where they are seen as individual pairs (Phillips, 1922–26). The courtship display of the male is relatively simple, as is typical of many perching ducks, and consists of his bill-tossing courtship call, uttered either on water or on land. A rapid preening behind the wing, quickly exposing and again hiding the iridescent speculum, is another of the male's displays. Much of the time the male simply swims beside the female and turns to face her whenever the opportunity arises. Copulation occurs on water of swimming depth, and is preceded by slight head-bobbing or bill-dipping movements on the part of the male. The female usually becomes prone for some time prior to mounting by the male; and after treading is completed, the male utters a single call with his bill-tossing movement and turns and faces the female



MAP 56. Breeding or residential (hatched) and wintering (stippling) distributions of the ringed teal.

in a motionless posture for several seconds (Johnsgard, 1965a).

Reproductive biology. Almost nothing is known of this species' breeding under natural conditions, but Olrog (1968) states that the birds usually nest in the large stick nests of the monk parakeet (*Myiopsitta monarcha*). The nesting season is not certain, but Weller (1968a) collected two males in May that had just completed their wing molts, and Wetmore (1926) indicated that birds in Paraguay were in breeding condition in September. The collection of young there in January and February also suggests late summer and fall breeding. In captivity, females prefer to nest in cavities, and the clutch size is from 6 to 12 eggs. The incubation period is 26 to 28 days (not 23 as sometimes reported), and incubation presumably is carried out entirely by the female. However, males remain close at hand and even enter the nesting hole either to help incubate or to protect the female. The male is more concerned with parental care of the brood than is the female (E. Dale Crider, pers. comm.).

Status. The status of this bird is poorly known, although there is no indication that it is unusually rare.

Relationships. I have reviewed (1960a) the anatomical and behavioral traits of this species, which has in general been placed in the genus *Anas*, and concluded that it should be considered a monotypic genus of perching duck. This suggestion was supported by Woolfenden (1961) on the basis of the species' skeletal anatomy. Both of us concluded that *Amazonetta* is probably the nearest living relative of *Callonetta*. However, the feather proteins of the ringed teal are definitely *Anas*-like, with lesser similarities to *Amazonetta* (Brush, 1976).

Suggested readings. Johnsgard, 1960a, 1965a.

North American Wood Duck

Aix sponsa (Linnaeus) 1758

Other vernacular names. Carolina duck, woodie; Brautente (German); canard carolin (French); pato del bosque de Carolina (Spanish).

Subspecies and range. No subspecies recognized. Breeds in North America from British Columbia to California, and from Lake Winnipeg eastward to southern Nova Scotia, and south to Texas, Florida, and Cuba. Winters in the southern half of its breeding range. See map 57.

Measurements and weights. Folded wing: males, 250–85 mm; females, 208–30 mm. Culmen: males, 30–35 mm; females, 550–680 mm. Weights: males, 539–879 g (av. 680 g); females, 482–879 g (av. 539 g). Eggs: av. 52 x 40 mm, whitish, 44 g.

Identification and field marks. Length 17–20″ (43–51 cm). *Males* in breeding plumage are unmistakable, with a strongly crested head that has mostly iridescent colors on the crown and sides, but with a white throat, a white stripe leading from the eye to the end of the crest, and a second, narrower white stripe from the base of the bill to the tip of the crest. The upper wing surface and back are also mostly iridescent with a blue and green sheen; the breast is maroon with white spotting, separated from vermiculated yellow flanks by vertical black and white bars. Narrow black and white markings occur on the upper edge of the flanks, and the abdomen is white. The tail coverts are brown, blackish, and maroon, while the tail is iridescent greenish black. The upper wing surface is mostly iridescent blue or greenish blue, but the secondaries are narrowly tipped with white and the primaries have a silvery white sheen on the outer vanes. The eyes are red, the legs and feet are yellow, and the bill is brightly patterned with black, white, and red. *Males in eclipse* plumage resemble females but have a pinkish bill and retain their white cheek and throat pattern. *Females* are mostly olive brown above, with large whitish spotting on the flanks and breast, grading to white on the underparts. The head is generally grayish on the sides and greenish black on the crown, with a large white eye-ring that extends posteriorly as a pronounced eye-stripe, and a whitish throat. The upper wing surface generally resembles that of the male, but the iridescence is not so highly developed and the white spots at the tips of the secondaries are larger. The iris is dark brown, the bill is blackish, and the legs and feet are like the male's. *Immatures* resemble adult females, but have streaked and mottled brown bellies, and immature males soon begin to exhibit the white chin and throat pattern typical of adult birds.

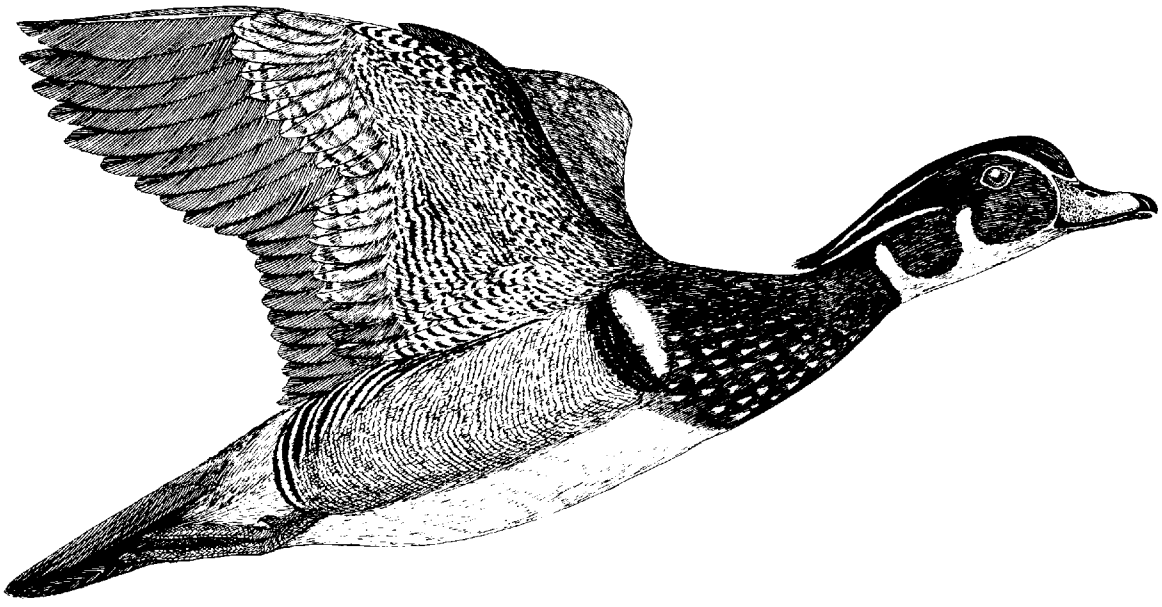
In the field, the crested head and the long tail, which is carried high above the water by swimming birds, are distinctive field marks for both sexes.

Wood ducks in flight exhibit a generally grayish underwing surface, with a narrow white trailing edge on the secondaries. The birds move their heads almost constantly when in flight, producing a unique "rubber-necked" appearance. The female's flight call is a drawn-out and owllike *u-ih,* and her courtship note is a sharp-noted whistle; neither sex exhibits typical quacking notes.

Natural History

Habitat and foods. The breeding habitat of wood ducks is typically one of fresh-water areas such as sloughs, ponds, and slowly moving rivers, where large hardwoods such as oaks, cottonwoods, and willows are present. Trees large enough to have cavities with openings at least 3.5 inches wide and interiors at least 8 inches in diameter are needed for nesting sites. Preferred foods include nuts, particularly acorns, hickory nuts, and beechnuts, and the seeds of various floating-leaf aquatic plants, including water lilies (*Nuphar, Nymphaea*). The birds also consume large quantities of the vegetative parts and seeds of other aquatic plants, including pondweeds, wild rice, arrow arum, and duckweeds. Oak species that produce small acorns are utilized more often than those producing large ones, and the acorns are either gleaned from the forest litter or plucked from the trees before they have fallen. When foraging on the water, wood ducks often tip up and can gather materials from water about as deep as 18 inches, but they only very rarely resort to diving for food (Johnsgard, 1975).

Social behavior. Wood ducks are highly social only on migration and in their wintering areas, where common roosting sites are used and the number of birds using them may range from fewer than 100 to several thousand, with a single instance of a roost being used by 5,400 birds (Hester & Quay, 1961). By the time they arrive at their breeding grounds the birds are already paired and usually in groups of no more than a dozen. Territorial boundaries are apparently lacking among wood ducks, and although males defend their mates from the attentions of other males, they freely share common ponds. Nesting concentrations are limited by available nest sites rather than territorial needs. Pair formation occurs in wintering areas, and is preceded by a period of intense courtship display, most of which occurs on water. Inciting by the female is an integral compo-



MAP 57. Breeding (hatched) and wintering (stippling) distributions of the North American wood duck.

nent of this process, and allows each female to "choose" a particular male, which usually responds to such inciting by a variety of display postures and calls. These include mock drinking, ritualized or display preening of the iridescent wing feathers, whistling with erected crest and stretched neck (burping), and various display shakes. Turning of the back of the head toward the inciting female is apparently a fundamental component of pair-forming behavior (Johnsgard, 1960b). Copulation is preceded by the female's assuming a prone posture on the water, without obvious prior display activity, and by the male's swimming about her, performing drinking, bill-dipping, or gentle pecking movements. After treading is completed, the male first swims rapidly away from the female while turning the back of the head toward her, and then turns and faces the female as she bathes (Johnsgard, 1965a).

Reproductive biology. Shortly after the pair arrives at its nesting area, they begin to seek out a nesting site. Males accompany their mates on these flights and may help locate potential nesting holes, but the female apparently is responsible for investigating and choosing the specific cavity to be used. Wood ducks prefer trees having natural cavities that are located fairly high and with entrances too small for raccoons to enter. Cavities in trees over water are preferred to those over land, and locations in groves or rows of trees are preferred over solitary tree sites. Clutch sizes tend to be large, and are often inflated further by dump nesting. Probably from 13 to 15 eggs represent a normal clutch, with the eggs laid on a daily basis. Incubation is performed only by the female and on the average requires 30 days. Generally, the male will remain with his mate until about the fourth week of incubation, at which time he deserts her to begin his postnuptial molt. When hatching is finished, the female usually keeps her brood in the nest through one night, then calls them out of the nest the following morning. After jumping to the ground, the female leads them to the nearest water. Little contact between broods occurs during the first two weeks of life, but thereafter brood mergers become increasingly frequent. Females probably normally leave their broods and begin their own molt between six and seven weeks after the young have hatched, and the young complete the rest of their 60-day fledging period on their own (Grice & Rogers, 1965; Johnsgard, 1975).

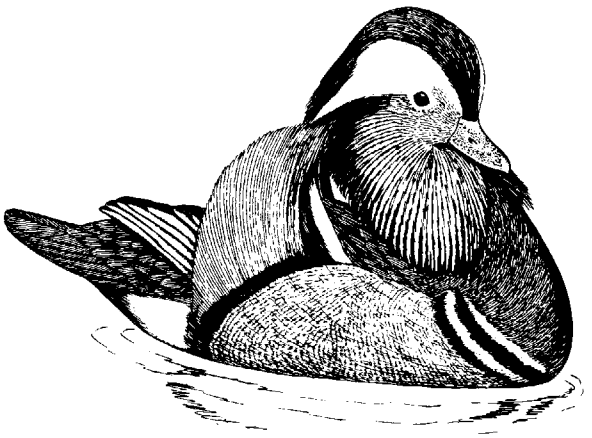
Status. The population status of the wood duck was extremely serious in the late 1930s, but an intensive program of nest-box erection and protection has brought the species back to a generally excellent status, and its range continues to expand into the Midwest. Bellrose (1976) summarized recent breeding population estimates that suggest a total population of more than 1.3 million birds, with Ontario having the largest single component. Probably the increase in beaver ponds and nesting cavities due to the activities of pileated woodpeckers has supplemented hunting restrictions to bring about Ontario's population increase, but in the southern part of the breeding range increased swamp drainage and forest clearing have caused population reverses in recent years.

Relationships. The strong plumage and behavioral similarities between the wood duck and mandarin duck argue for their close relationships, in spite of the fact that they only very rarely successfully hybridize (Johnsgard, 1968b).

Suggested readings. Grice & Rogers, 1965; Bellrose, 1976; Johnsgard, 1975.

Mandarin Duck

Aix galericulata (Linnaeus) 1758



Other vernacular names. None in general English use. Mandarinente (German); canard mandarin (French); pato mandarín (Spanish).

Subspecies and range. No subspecies recognized. Breeds in eastern Asia from the Amur and Ussuri rivers through Korea, eastern China, and Japan to the Ryukyu Islands (Okinawa). Feral in Great Britain and northern Europe. Winters in the southern part of its breeding range and south to southeastern China, rarely to Taiwan. See map 58.

Measurements and weights. Folded wing: males, 210–45 mm; females, 217–35 mm. Culmen: males, 26–32 mm; females, 26–30 mm. Weights: both sexes combined, 444–550 g (Tso-hsin, 1963). Eggs: av. 49 x 36 mm, whitish cream, 41 g.

Identification and field marks. Length 17–20″ (43–51 cm). Plate 35. *Males* in breeding plumage have an iridescent crown that extends to a long crest, bounded below by a white to buff area extending from the bill to the crest tip, and downward to below the eyes, where it merges with chestnut cheeks and extended hackles. The breast is a rich maroon, separated from the flanks by three black and two white vertical stripes; the abdomen and under tail coverts are white; and the flanks are a finely vermiculated gold and black. The back and tail are olive brown, while the longer upper tail coverts are bluish green. The scapulars are mostly iridescent blue, as are the tertials, except for the outermost one (12th secondary), which is iridescent on its outer web but orange gold and greatly enlarged on the inner web into a saillike shape. The other secondaries are iridescent green, tipped with white, while the rest of the upper wing surface is mostly olive brown. The bill is red, with a whitish nail, and the feet and legs are yellow. *Eclipse-plumage males* resemble females, but have a reddish bill color. *Females* have gray heads, with a white eye-ring that extends narrowly backwards into an eye-stripe, a buff and brown mottled breast and flank pattern, white underparts, and a greenish brown upperpart coloration. Their wing pattern resembles that of the male, but lacks the specialized "sail" feather. The bill is grayish black, and the legs and feet reddish yellow. *Immature* males closely resemble females, but have a pinkish bill.

In the field, mandarins are unlikely to be confused with any other species when males are in full plumage. Females closely resemble female wood ducks, but have a lighter gray head color and a less distinctive white eye-ring and eye-stripe. The male produces a nasal whistling note in display, and the female a brief, high-pitched courtship call, *kett,* similar to the wood duck's, as well as other, softer notes. A specific flight call other than quacking has not been mentioned in the literature.

Natural History

Habitat and foods. The mandarin's typical breeding habitat is river valleys with wooded islands, forest lakelets with willow-lined banks, and small forest ponds. Swamps surrounded by broad-leaved trees, with reed-covered water surfaces, are also favored habitats. During the daytime mandarins spend much time in shady areas, such as river banks, and are most active in foraging at dawn and dusk. Their foods are quite variable with season and locality, but acorns are a favorite fall food, as well as cultivated grains such as buckwheat and rice. Spring foods are also variable, and include insects, snails, small fish, and vegetation. Seeds of aquatic plants, the roots and stems of such plants, shoots of horsetails (*Equisetum*), and the fruits or seeds of such terrestrial plants as grapes, roses, rhododendrons, and even pines have reportedly been found in mandarins (Dementiev & Gladkov, 1967; Tso-hsin, 1963).

Social behavior. Mandarins are highly social, and flock sizes may be quite large in winter, when groups of 100 or more are commonly seen. Drakes also col-

MAP 58. Breeding (hatched) and wintering (stippling) distributions of the mandarin duck.

lect in groups during molting periods in late summer in some areas, but elsewhere reportedly remain solitary. Although seasonal, the pair bonds are very strong; and if both sexes remain alive through two breeding seasons, they re-form old pair bonds rather than establishing new ones. Courtship display begins in fall, and during the fall social display period incipient pair bonds may form slowly and subsequently be broken, whereas pairing during spring is much more direct and strong pair bonds may be formed in only a week or so (Bruggers, 1974). Displays are elaborate and complex, involving several ritualized shaking movements, display drinking, and display preening, the last display being restricted to the "sail" feather and oriented toward a specific female (Lorenz, 1951–53). Females take the initiative in choosing mates by orienting inciting behavior toward a preferred male. They also often initiate copulatory behavior, performing slight head-pumping movements before extending themselves prone on the water. The male performs a series of bill-dipping movements before mounting, and after treading swims rapidly away from the female while orienting the back of his head toward her (Johnsgard, 1965a). Probably most pair formation occurs on the wintering grounds and during the spring migration back to the breeding areas.

Reproductive biology. In Manchuria and China the nesting season extends from late April to July; the birds have been reported to arrive already paired and ready to establish nesting territories. Females take the initiative in looking for suitable nests, but are always accompanied by the males as they examine tree hollows. Nearly all nests are in such locations, usually in trees near or overhanging water, and often in trees with trunks covered by grapevines. Sometimes tree stumps are used, and rarely the birds nest on the

ground, under fallen trees or other dense vegetation. The clutch size ranges from 9 to 12 eggs, and in captivity averages 9.5 eggs. The incubation period is from 28 to 30 days, with the female incubating about 80 percent of the daylight hours and all through the night. She is joined by her mate during the short daytime breaks in incubation (Bruggers, 1974). Newly hatched young occur from late May until late July, and newly fledged birds have been seen as early as the first part of June. The fledging period has been reported as six weeks (Scott & Boyd, 1957). Males abandon their mates at some point before hatching and undergo their flightless molt at this time, while females molt at a somewhat later period (Dementiev & Gladkov, 1967).

Status. The mandarin is apparently still quite common over most of its native range, and is hunted in only a few areas, such as the Maritime territory of the U.S.S.R. The species is also now well established in parts of England (Beames, 1969), and feral birds also occur in Scotland and some parts of northern Europe.

Relationships. All evidence indicates a very close relationship between the wood duck and mandarin duck, both behaviorally and morphologically. There has been some controversy about whether the two species ever hybridize, but a recent review (Johnsgard, 1968b) indicates that this does occasionally occur. The genus *Aix* is probably very closely related to *Chenonetta* and also shows affinities with *Cairina* (Johnsgard, 1965a; Woolfenden, 1961).

Suggested readings. Dementiev & Gladkov, 1967; Savage, 1952; Bruggers, 1974.

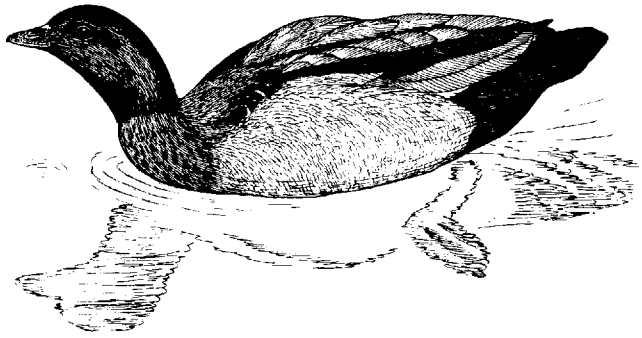
Measurements and weights. Folded wing: males, 254–90 mm; females, 252–84 mm. Culmen: males, 24–31 mm; females, 22–31 mm. Weights: males, 700–955 g (av. 815 g); females, 662–984 g (av. 800 g). Eggs: av. 54 x 42 mm, creamy, 54 g.

Identification and field marks. Length 19–22″ (48–56 cm). *Males* have a brown head and neck, with a short black mane; a breast and upper back that is mottled gray, black, and buff; a black abdomen; finely vermiculated grayish sides and lower back; a black tail, tail coverts, and outer scapulars; and an upper wing with gray coverts, black primaries, and secondaries forming an iridescent green and white speculum, the green being bounded narrowly in front with white and with a white posterior border that increases in size outward. The bill, legs, and feet are olive brown. *Females* have a buff and dark brown head with distinct eye-stripes and cheek-stripes, and their breasts and flanks are also mottled with buff and brown; no vermiculations are present. *Immatures* closely resemble females but are lighter. Vermiculations on the flanks of males begin to appear at about three months of age, and provide initial outward sex criteria.

In the field, Australian wood ducks are unlikely to be confused with any other Australian waterfowl except perhaps the Australian shelduck, which, however, has white on the forewings rather than on the secondaries. The black hindquarters of male wood ducks also separate them from other, similar waterfowl. The courtship call of the male is a single-syllable, catlike *wee-ow* sound; and the most common of the female's calls is a loud, hoarse *whroo,*

Australian Wood Duck

Chenonetta jubata (Latham) 1801



Other vernacular names. Maned goose; Mähnengans (German); bernache à crinière (French); ganso de melena (Spanish).

Subspecies and range. No subspecies recognized. Resident throughout Australia, including Tasmania. See map 59.

lasting nearly a second, but she also produces repeated nasal *wonk* sounds when inciting.

Natural History

Habitat and foods. In Australia, wood ducks are likely to be found wherever lightly timbered country is adjacent to water and short grass or herbaceous cover is present under the trees. Although the birds favor the inland rivers of New South Wales, the water can be of almost any type so long as it is not saline or brackish. Likewise, the heaviest forests and densest swamps are avoided. The most important component is the presence of green herbage suitable for grazing, which is usually done at night. Almost no animal food is consumed, and most of the plant material is vegetative rather than seeds. A wide variety of grasses are consumed, and second to this group are the sedges. Broad-leaved herbs, especially smartweeds and legumes, make up the third component of the diet. Evidently only during the first month of life are insects and other invertebrate foods of significance to this species (Frith, 1967).

Social behavior. Wood ducks are quite gregarious, and flocks numbering as many as 2,000 or more individuals have been reported. Such flocking occurs after the breeding period; the flocks are evidently comprised of family groups. Such groups of birds are likely to be found in the same area year after year, forming "camps" that combine suitable roosting sites and available foraging areas within a few miles. The duration and size of such camps varies from year to

Map 59. Residential distribution of the Australian wood duck, showing area of densest populations (cross-hatching) and total potential breeding range (hatching).

year, depending on local rainfall patterns, and the species may be better regarded as nomadic than migratory in the usual sense. Judging from banded birds, it appears that most seasonal movements are under 100 miles; less than 10 percent of the banded birds had moved over 200 miles when shot (Frith, 1967). Pair bonds apparently are strong in this species, and quite possibly are relatively permanent, as there is no seasonal variation in male plumages and breeding times are often erratic. The sexual displays are relatively simple, consisting of ritualized shaking movements by the male, performed either on land or in the water. The male also frequently utters his display call, or burp, while extending the neck and raising his short mane. Females incite their mates or potential mates to attack other birds, but very little fighting seems to be done. Display preening almost certainly occurs, judging from the presence of an elaborate speculum, but it has not yet been described. Copulation occurs on water, and is preceded by bill-dipping, head-dipping, or head-pumping movements by the male and perhaps also the female. The postcopulatory display consists of the male swimming around and away from the female with his hindquarters strongly raised and his head and neck extended forward (Johnsgard, 1965a).

Reproductive biology. To a very large extent, the breeding season of wood ducks in Australia is irregular and dependent upon the timing of rainfall, since it dictates when green grass will be available. In the southern highlands, where rainfall is fairly regular, breeding occurs in the spring, mainly September and October. However, farther north in New South Wales, the season is much more extended and may occur anytime during the year. However, it is concentrated between January and March, following the major rainy period. In the more arid inlands, the breeding is wholly controlled by rainfall and can occur anytime. In years when no rain of significance occurs, there is no breeding and the birds may leave the area to breed elsewhere. Mated pairs spend a good deal of time searching together for suitable nest sites. Females select hollows in trees, usually live ones at varying distances from water. At times they may be at least a mile from water, or they may directly overhang the edge of a lagoon. The hollow is lined with gray down, and a clutch ranging from 9 to 11 eggs is laid. The incubation period is 28 days, and only the female incubates, although the male remains close at hand. When there is no water near the nest, the male occupies the nearest available water area and keeps other males away from the vicinity. After hatching, the female and brood join the male, and as the young grow, the family gradually moves to other areas where they join similar groups (Frith, 1967).

Status. Wood ducks are shot extensively in Australia for sport, and farmers are also allowed locally to shoot them to avoid damage to rice crops. Damage to young rice stands can be substantial if flocks are allowed to feed on them repeatedly, but a small amount of foraging does little or no damage, and may even stimulate tillering. Damage to newly sown pastures has also been reported in some areas. The birds are unusually wary and difficult to hunt, and thus they are not especially sensitive to sport hunting. There is no evidence that the species is currently declining or otherwise in any danger (Frith, 1967).

Relationships. The genus *Chenonetta,* although distinctive, exhibits some strong similarities to several other perching duck genera, including *Nettapus, Aix,* and *Amazonetta.* The social displays indicate such affinities, and so too do several aspects of the skeletal anatomy (Woolfenden, 1961).

Suggested readings. Frith, 1967.

Brazilian Teal

Amazonetta brasiliensis (Gmelin) 1789

Other vernacular names. None in general English use. Amazonasente (German); sarcelle du Brésil (French); cerceta brazileña (Spanish).

Subspecies and ranges. (See map 60.)

A. b. brasiliensis: Lesser Brazilian teal. Resident from Colombia and Venezuela south to the state of São Paulo and the southern part of the Matto Grosso.

A. b. ipecutiri: Greater Brazilian teal. Resident in southern Brazil, eastern Bolivia, Uruguay, and northern Argentina south to Buenos Aires Province. Probably partially migratory.

Measurements and weights. (For *brasiliensis.*) Folded wing: males, 170–92 mm; females, 168–85 mm. Culmen: males, 34–39 mm; females, 32–36 mm. Weights: males, 380–480 g; females, 350–90

g (Kolbe, 1972). Weller (1968a) reports two males of *ipecutiri* averaging 600 g and a female at 580 g. Eggs: 49 x 35 mm, pale cream, 31 g.

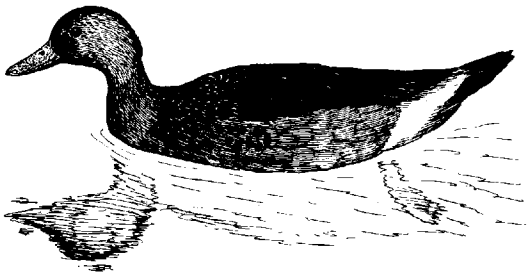
Identification and field marks. Length 14–16″ (35–40 cm). *Males* have a head pattern of gray, brown, and black, with the crown and hind neck darkest and the ear region lightest, like those of the male ringed teal. The breast and anterior flanks are barred and spotted with rusty brown, buff, and black, and the posterior flanks, rump, and tail coverts are more uniformly brown, as is the back. The tail is black, and the entire upper wing surface is iridescent green to purplish, except for the secondaries, which are green anteriorly and white posteriorly, the two colors separated by a narrow black bar. The bill, legs, and feet are bright red. *Females* are similar to males but have a grayish bill and buffy white markings in front of the eyes and at the base of the bill, as well as a whitish throat. *Immatures* closely resemble adult females, but are duller in patterning.

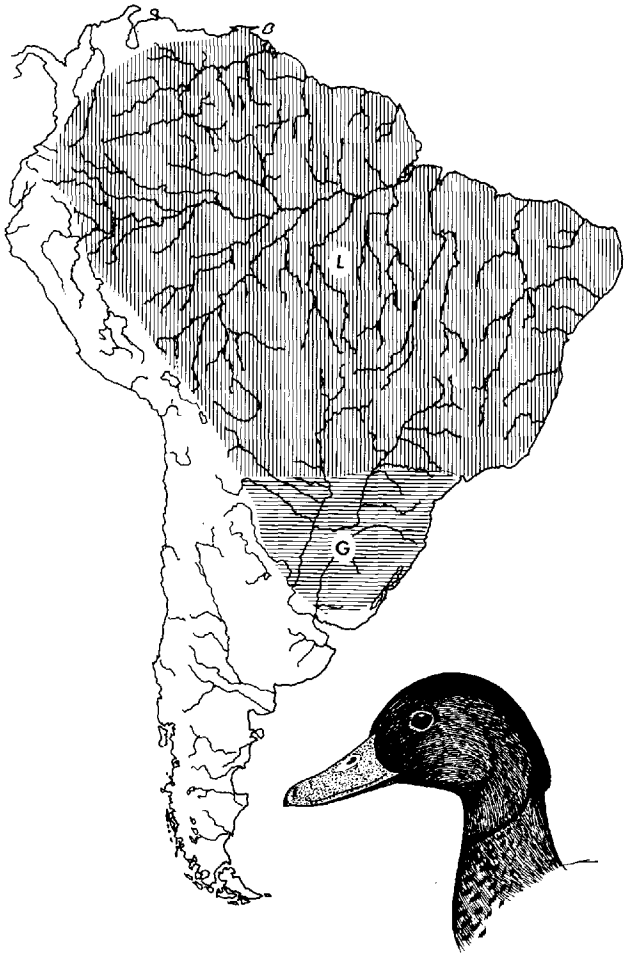
In the field, this species is most likely to be confused with the ringed teal, but the bright red bill of the male should separate it easily. Females quite closely resemble female ringed teal, but lack white markings behind the eyes and on the sides of the rump. In flight, both sexes show a large white triangular mark on the trailing edge of the secondary feathers. Females have a typical ducklike quacking note quite different from that of the ringed teal, and males utter a strong, piercing whistle, *whee-whee-whee.*

Natural History

Habitat and foods. This species inhabits heavily vegetated lagoons, especially those surrounded by woodlands. They evidently avoid coastal and mangrove lagoons, and seem to prefer small water areas to larger ones. Almost nothing is known of their foods under natural conditions; three specimens that were examined contained marsh "fruits," bulbous roots, a planarian, and an insect that was probably a locust (Phillips, 1922–26).

Social behavior. In general, flock sizes of Brazilian teal appear to be quite small, and flocks probably consist of family units. Flocks of from 10 to 20 birds have been reported by some observers. The pair bond is seemingly quite strong and, considering the absence of a definite eclipse plumage in males, is quite probably permanent. Almost nothing is known of the time of nesting, but in northern Argentina, Weller collected females in mid-May that were ready to lay, indicating late-fall nesting in that region. However, males acquiring new wing feathers





Map 60. Breeding or residential distributions of the greater ("G") and lesser ("L") Brazilian teals.

in mid-February have been collected in Paraguay, suggesting a breeding season several months earlier in that area (Weller, 1968a). The pair-bonding behavior of this species is relatively simple, and no complex displays have yet been described. Females incite their mates or potential mates with a series of rapidly alternated chin-lifting and lateral bill-pointing movements, making an associated *week* note, to which the male typically responds with a repeated whistling note while swimming rapidly ahead of her. A wing-preening display has been reported, but it seemingly is not nearly so common as the iridescent upper wing surface might suggest. However, wing flapping is common during social display and may display not only the upper wing surface but also the blackish underwing and contrasting white axillary feathers. Copulation is preceded by mutual bill-dipping or head-dipping movements, and is followed by the male's calling once and then swimming around the female in a tight circle as he holds his head and bill rigidly downward (Johnsgard, 1965a).

Reproductive biology. It appears that hole nesting is not the normal mode of behavior in Brazilian teal, in contrast to typical perching ducks. Very few nests have actually been found in the wild, but current evidence supports the idea that the birds normally nest on sedge hummocks surrounded by water. Some early observers suspected that they might nest on cliff sides, inasmuch as pairs have been seen in such locations. At least one nest has been found in a tree about eight feet above the ground, on the top of a previous year's blackbird (*Pseudoleistes*) nest. The clutch size is from 6 to 8 eggs, which are incubated entirely by the female. The incubation period is 25 days; and as soon as hatching occurs, the female and brood are joined by the male, who helps protect the young. Indeed, there is one case of a pair in captivity in which the male took over the care of the young completely, freeing the female to begin a second clutch (Phillips, 1922–26).

Status. Brazilian teal are said to be among the commonest ducks in Brazil (Delacour, 1954–64), and there is no reason to believe that they are not relatively plentiful throughout most of their original range. Hunting is an insignificant cause of mortality over this species' range, and its habitat requirements do not appear to be particularly specialized. Thus, there should be no concern for its status at present.

Relationships. Although frequently placed in the genus *Anas*, it has long been recognized that this species is not a typical teal (Phillips, 1924). Finally the genus *Amazonetta* was suggested for it by J. M. Derscheid, who recognized its perching duck affinities with the ringed teal. Woolfenden (1961) found skeletal similarities supporting the relationship between these two species, but suggested that they deserve generic separation, and my own (1965a) behavioral studies have likewise supported this interpretation.

Suggested readings. Phillips, 1922–26.