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Cranes of the World: Blue Crane (*Anthropoides paradises*)

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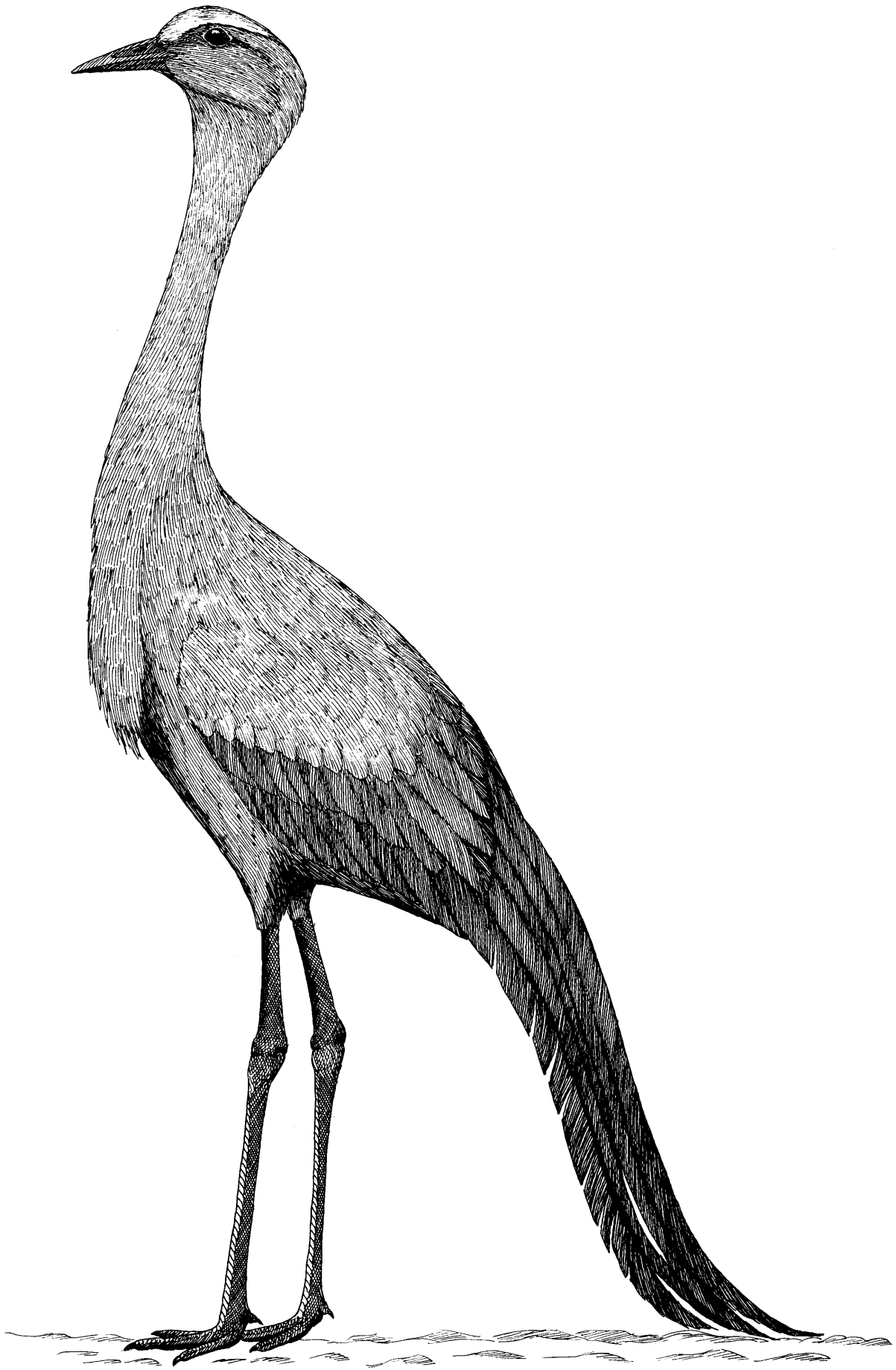
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Blue Crane

Anthropoides paradisea (Lichtenstein) 1793

Other Vernacular Names. Stanley crane; Bloukraan (Afrikaan); Grue bleue (French); Paradieskranich (German); Hagoromo zuru (Japanese); Chetyrekhkrydy zhuravl (Russian); Grulla azul (Spanish); Groote Sprinkhaan-vogel (Boers, Transvaal).

Range. Resident in the upland interior of South Africa and possibly adjacent Mozambique north almost to the Zambezi, and with a small isolated population near the Etosha Pan of Namibia (South-West Africa).

Subspecies. None recognized.

Measurements. Wing (both sexes), 514-590 mm (average of 10, 552.6 mm). Exposed culmen, 81-98 mm (average of 10, 88.8 mm). Tarsus, 205-252 mm (average of 10, 235.2 mm). Eggs, average 92.4 × 59.63 mm (80.6-101.0 × 55.1-66.5) (Walkinshaw, 1973).

Weights. Few weights are available, but a male and a female at the International Crane Foundation weighed 5,675 and 3,632 grams respectively. The estimated egg weight is 181 grams. Walkinshaw (1963) noted that six newly laid eggs averaged 185.3 grams (range 168.2-201.8).

Description

Adults of both sexes are almost uniformly bluish gray, becoming darker on the upper neck and the lower half of the head and nape, where the feathers are thick, dense, and decomposed. The crown, forehead, lores, and anterior cheeks are lighter, sometimes almost white, while the cheeks, ear coverts, and nape are dark ashy gray, with the feathers loose and lengthened, producing a distinctive “cobra-like” profile. The feathers of the lower foreneck are also elongated and pointed, and the secondaries, especially the inner ones,

are extremely elongated, sometimes reaching the ground. The primaries are black or slate gray, with dark coverts, and the secondaries are blackish near the tips. The tail is black or nearly black. The iris is dark brown, the bill is ochre to grayish, tinged with pink basally, and the legs and toes are dark gray or black.

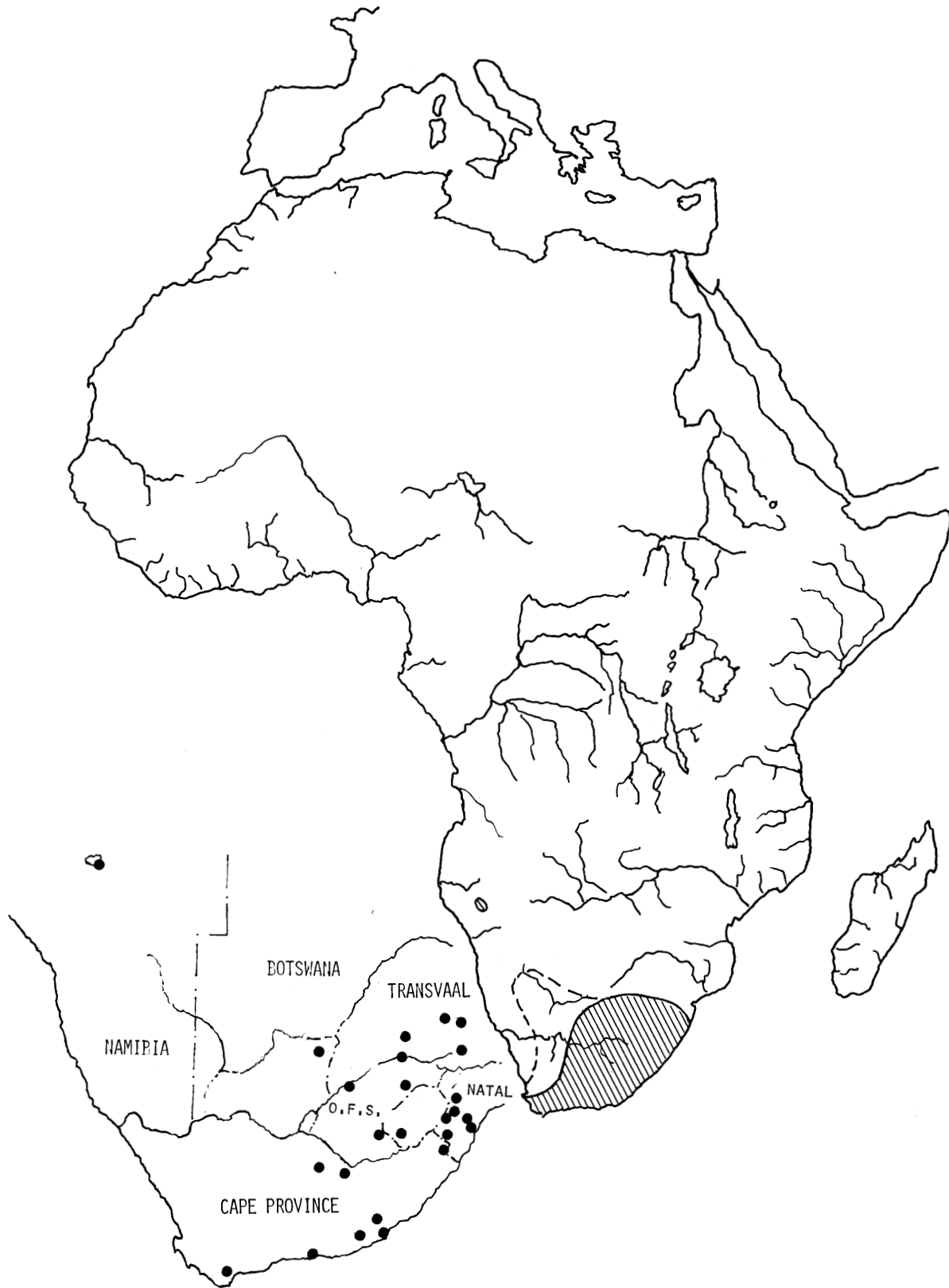
Juveniles are slightly lighter gray than adults, and are somewhat tawny on the top of the head. They also lack the long wing plumes of adults.

Downy chicks are buffy yellow over the entire head and most of the neck, with the shoulders, the upper portion of the wings, the back, the rump, and part of the sides pearly gray, with scattered buffy areas along the sides. The lower throat and the breast as well as the undersides of the wings are nearly white, and there is a pale buffy area around the eye. The iris is dark brown, the bill is pale bluish gray with a flesh-colored base, and the legs and toes are initially bluish gray, gradually becoming darker gray on the legs and tops of the toes (Walkinshaw, 1973).

Identification

In the field, this is the only African crane that is uniformly silvery bluish gray, with long, dangling inner secondaries that nearly touch the ground. In flight the birds appear to be almost entirely gray-bodied, with darker flight feathers and tail. The calls are raspy and pulsed, and are fairly low-pitched. The male often raises his wings and droops his primaries while calling in unison with the female.

In the hand, the distinctive bluish color, the greatly elongated inner secondaries, and a “cobra-like” head profile are all distinctive. The trachea does not penetrate the keel of the sternum.



Distribution of the blue crane in Africa (hatching), including peripheral area of nonbreeding occurrence (broken line). Inset indicates breeding records (after Snow, 1978).

BLUE CRANE

DISTRIBUTION AND HABITATS

Historical and Current Ranges

Both historically and at the present time the range of the blue crane has been a remarkably restricted one, confined almost exclusively to open grassy habitats in the upland interior of South Africa. Additionally, there is a small disjunctive breeding population in Namibia, to the south and east of the Etosha Pan (Snow, 1978). The species is generally found at lower altitudes during the winter months, but evidently breeds most commonly at elevations of 1,300 to 1,800 meters, in areas where relatively few large mammals are present and where disturbance from human activities and cattle pasturing is not severe.

The northern end of its South African breeding range is in the Transvaal, with the northern limit for breeding records in the vicinity of Belfast and Middelburg, at about 26° south latitude. The species is evidently widely distributed in Orange Free State, breeding in nearly all districts; it also breeds commonly and widely in Natal. In the latter area the birds nest occasionally in the dry thornveld zone (914-1,219 meters), but breed primarily in the highland sourveld (1,372-1,829 meters) and in the lower parts of the bergveld (2,000 meters). In the Drakensberg Mountains of southwestern Natal the birds sometimes nest as high as 2,134 meters (Walkinshaw, 1963, 1973). Breeding records in Cape Province are less numerous, but extend west to the Little Karoo (Walkinshaw, 1973; Snow, 1978).

Habitat Requirements and Densities

The habitats of this species in Natal, where it is perhaps as abundant as anywhere in its range, consist mostly of pastured grass-covered hills, valleys, and plains having a few scattered tree plantings. The grass and sedge cover in favored nesting areas is relatively thick and fairly short, and consists of species of such grass genera as *Pennisetum*, *Andropogon*, *Arundo*, and *Miscanthidium*, and sedges such as *Ascolepis*, *Pycreus*, *Cyperus*, *Scirpus*, and *Carex*. The climate is temperate, with dry, cold winters, and with more than 80 percent of the rain coming during the summer months, often in the form of hailstorms. During the colder months the birds leave their high-altitude breeding grounds and move to lower altitudes (Walkinshaw, 1963, 1973).

Few estimates of densities are available for this species. Walkinshaw (1963, 1973) reported that in one Natal locality where nine pairs were breeding, the average distance between nests was 1,711 meters. In favorable situations the pairs were generally separated from one another by at least 400 meters, although in hilly areas, where visual isolation was enhanced by the topography, pairs would sometimes nest within sight of one another and would have contiguous foraging areas.

FOODS AND FORAGING BEHAVIOR

Foods of Adults

In Walkinshaw's (1963, 1973) observations, he noted that nesting blue cranes often fed from the ground, capturing insects such as grasshoppers, and also capturing frogs and crabs. However, more often they fed on seeds from the heads of grasses and sedges growing near their nests. At times the birds also ate crabs (*Potamon* sp.), parts of which they fed to their young.

As an incubating bird left its nest, it would walk to its regular feeding ground, stopping at times to drink or preen, and sometimes pecking at morsels. Occasionally the birds would walk as far as a kilometer from the nest to feed, but rarely did they fly.

Foods of Young

Van Ee (1966) noted that newly hatched birds at the Bloemfontein Zoo were initially offered small crickets, pieces of earthworms, ladybirds, pieces of grasshoppers, ant eggs, snails, and the like by the female. After the chicks were ten days old they began to consume frogs, toads, small lizards, and small snakes.

Foraging Behavior

Little has been written on foraging behavior, but it is apparent that the birds feed primarily from the surface of the ground and from low-growing vegetation. They have not been observed digging with their bills, nor is feeding in water evidently a normal mode of foraging. Blaauw (1897) does note that various plant bulbs are also consumed by the birds, suggesting that probing, or perhaps pulling of plants up by their roots, may be a method of foraging.

MIGRATIONS AND MOVEMENTS

Seasonal Movements

Although it is apparent that migration does occur in this species, rather little is known of its details. Walkinshaw (1963, 1973) notes that the birds are migratory in Natal, moving northwestward in March and returning in early September. However, he mentioned that in the Drakensberg Mountain region of Natal the migration is chiefly altitudinal, with the birds moving down in March and up in September.

During periods of winter concentration, up to as many as 200 or 300 birds may gather in favored areas. Among these are the Swartberg District, East Griqualand, near the Drakensberg Mountains, where up to 200 birds concentrate. In Orange Free State as many as 300 commonly occur during winter (Walkinshaw, 1973). The northern end of Orange Free State, on the Vaal River near Bloemhof, was a major wintering area

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according to Blaauw (1897). Here the birds would gather, in groups of 50 or even as many as 300 birds, and spend the daylight hours feeding among herds of springbok antelopes, and the nights sleeping in pools in the company of crowned cranes, flamingos, and storks. Evidently the cranes and springboks formed an integrated society, with the cranes often warning the antelopes of possible danger.

Daily Movements

Walkinshaw (1963, 1973) noted that breeding birds sometimes moved as far as a kilometer from the nest site for foraging, usually walking the entire distance. No other information is available on daily movements.

GENERAL BIOLOGY

Sociality

Although sociality in wild flocks is not well documented, some interesting observations of van Ee (1966) are perhaps relevant. He studied a flock of ten birds in the 35-acre grounds of the Bloemfontein Zoo. The flock consists of four two-year-old birds of unknown sex and six adult birds having an even sex ratio. The birds were released during July (winter), when the species is normally flocking. After a few weeks, the birds moved into nearby lucerne (alfalfa) fields, and remained there. During the first week of September, one of the adult males began to exhibit dominance and would lead the flock during foraging activities. A second bird began to exhibit dominance traits 13 days later than the first, and within 21 days the other full-grown birds were behaving similarly. On September 25 the adults began to attack the younger birds, striking them with their beaks and legs. This resulted in the death of one of the young birds on September 30. The other young birds escaped into the zoo grounds. On October 18 the group of remaining adults broke up, after pair-forming behavior had begun in one of the pairs. On October 24 the other four birds also left the fields for the zoo grounds.

During aggressive chases between the adults, a typical pattern occurred. One of the paired birds would lower its head to the ground, shake its wings, then raise its head. Or, it would stand in an erect posture, shake its tail, and sometimes call. The calling alone would usually cause retreat in the other four birds, but sometimes after calling the dominant male would attack them. During this period the male was typically the aggressor, but on two occasions the female was also observed performing the same aggressive behavior.

Daily Activities

Little has been written on daily cycles of activity. In one pair studied by Walkinshaw (1963, 1973), the

female incubated at night, while in another pair the male did. In this area, sunrise occurred just before 5:00 a.m., and on two days the first morning exchange at the nest occurred at 5:30 and at 6:12. Sunset was at 7:00 p.m., and during three days the final nest exchange occurred at 6:15, 6:30, and 6:12 p.m. This would suggest that, as in other cranes, roosting times are closely tied to sunrise and sunset.

After the young birds are fledged and fully grown, they form large flocks, roosting as a group in shallow water at night, and flying out shortly after daylight to feed in nearby fields (Walkinshaw, 1963).

Interspecific Interactions

Blue cranes share their habitat with both wattled cranes and crowned cranes in eastern South Africa, and are appreciably smaller than wattled cranes but of about the same size as crowned cranes. To what extent they might compete for foods or interact socially is still undescribed.

Other large birds that nest in the same marshy areas sometimes used by blue cranes are various herons, egrets, ibises, the white stork (*Ciconia ciconia*), the spur-winged goose (*Plectropterus gambensis*), and the secretary bird (*Sagittarius serpentarius*). It is possible that some of these species also compete with blue cranes for foods, or represent threats to eggs or young. However, nesting birds evidently relentlessly attack any bird or mammal that approaches their nest, including cattle, tortoises, guinea fowls, plovers, and even sparrows. Whenever a human entered the nesting area he was attacked by the male of the pair. Initially the bird would begin a threat, with wings spread, the body held erect, and the beak directed toward the person. If the person approached the nest more closely, an outright attack would follow, with kicking so severe that at times the bird's claws would become lodged in the person's clothing. Waving a stick or hat did not deter the bird, but only increased its ferocity. During this period the female would crouch with her wings spread, giving the impression of being wounded, and the male would invariably try to place himself between his mate and the person. When the person finally turned away from the nest and had retreated far enough for the male to stop his attacks, the pair would join in a mutual calling display for several times before returning to the nest. However, these observations were made on relatively tame zoo birds, and Walkinshaw (1963) found that whenever a person approached the nest of wild birds they would simply walk away from it, or would circle the man while walking a few meters apart, sometimes with wings outstretched, sometimes dancing, and sometimes calling. However, whenever another blue crane entered their territory they would chase it away, driving it out in flight.

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BREEDING BIOLOGY

Age of Maturity and Time of Breeding

Walkinshaw (1963) reported that one pair of captive blue cranes nested for the first time when they were five years old. Of two pairs that have bred at Flamingo Gardens, England, one initially bred when the male was nine and the female was seven years old, while a second bred when the male was eight and the female four (data from private survey by Joe B. Blossom, pers. comm.)

The breeding period is highly seasonal in this temperate-adapted species. Egg records are entirely limited to the period between October and March, with nearly half of the records occurring during December (see table 14). There is no evident variation in the nesting records from the Transvaal, Natal, or Orange Free State, judging from records mentioned by Walkinshaw (1973). Walkinshaw (1963) observed that of 17 nests studied in Natal 13 were in use during December, and only 2 were active after January 7. The latest nest record mentioned by him (1973) is from Cape Province, for a nest with eggs on March 1.

Pair Formation and Courtship

The only observations on pair-forming behavior are those of van Ee (1966). He observed that, among a group of six adult birds in which the sexes were evenly divided, apparent pair-forming behavior began in early October. This began with the birds running in circles, and it was not evident as to whether the activity was begun by the males or females. The running behavior lasted for as much as five minutes, intensified over a period of the next four days after it had begun, and was always followed by calling. On the following day, one of the males began to pick up bunches of grass, branches, and dried pieces of donkey-dung. He threw these items into the air, and jumped high in the air. He then ran around the other birds, stopped suddenly in front of one of the females, and then ran away from her and the other birds. After a run of about 150 yards he suddenly stopped and began calling. After two days, the "selected" female joined in the picking-up behavior, and jumped simultaneously into the air with him. The other four birds followed halfheartedly.

According to van Ee, the primary aspect of the courtship is the "dance." This might last for as much as one to four hours. It begins with the birds running around in circles, as if the male is chasing the female. However, there is no contact between them, and they are separated by a distance of about ten feet. Suddenly the two birds stop and call in unison.

The next phase is characterized by both birds simultaneously picking up bunches of grass, which are thrown into the air. The birds also jump high in the air,

run in circles, again pick up grasses and toss them, kicking at them as they come down, and once again run in small circles. This ritual may last for half an hour. The birds then stop very near one another and resume calling. They then run straight across the field, remaining very close to one another. The final phase is once again the throwing up of bunches of grass. This phase never lasts more than ten minutes and is performed with the birds facing one another. At times one bird will snap up the grass that had been thrown up by its partner and toss it up again. All these phases are repeated many times, and after every phase there is calling. The shortest complete ritual observed by van Ee was 28 minutes, and the longest was four hours. He noted that the behavior lasted for nearly two weeks, and was not terminated by copulation.

After two weeks of this dancing behavior, copulation was observed by van Ee. He reported that the receptive female crouches low, spreads her wings somewhat, raises her tail, and stretches the neck forward while bending it somewhat. The male mounts, grips her neck feathers just behind the nape, and places his claws on her "elbows." The wings are flapped as copulation begins, and at the end he lowers them to the ground, so as to have "an extra pivot." As he dismounts both birds begin to call. In one pair the female was observed to remain erect during copulation, and the male flapped his wings to maintain balance. A maximum of three copulations were seen during one day.

Territoriality and Early Nesting Behavior

As noted earlier, territories of wild birds in Natal were relatively large, with birds usually separated from other pairs by a distance of at least 400 meters, and with an average distance of 1,711 meters between the nests of nine pairs (Walkinshaw, 1963, 1973).

In his 1966 study, van Ee observed that the male begins selecting a nest site a week prior to the laying of the first egg. After copulation, the male would wander off slowly, and start picking up objects, dropping them again immediately in front of the female. At this time he would utter a very low call, sounding like *kworr*. The female would watch in a seemingly uninterested manner and wander off, with the male remaining behind and repeating the ritual several times. If the female did not return he would follow her and begin the same ritual on another location. This might be repeated for several days, until the female responded by inspecting the site, lifting and putting down the objects that he had gathered, and uttering a similar but higher-pitched call than that of the male. After accepting the site, the female began to clean it, and both birds would call repeatedly from the site. Van Ee never observed copulation at the nest site, which was typically a bare spot of ground that was slightly higher than its surroundings.

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Calling at the nesting site gradually intensified, finally reaching a rate of up to 13 times in 10 minutes.

Walkinshaw (1963) noted that nests were built in four habitat types. These included short grass and sedge-grown marshes (vleis), which extended through narrow valleys surrounded by grassy and pastured slopes, and grassy pastured fields themselves, marshy borders associated with dammed areas, and short-grass foothills. All nests found by Walkinshaw were only a few meters from dry land, if in wet situations, or not far from water if constructed in dry situations. In a pastured field, one nest was found with no nest material present at all, and when materials were present they were of grass or other materials adjacent to or very near the site. Nests in vleis were typically very small and of grassy material, while in marshy areas around dams a small pile of rushes was used for a site. However, in short-grass foothills the birds built rather elaborate nests of pebbles approximately a half-inch in diameter. These pebbles were placed side by side on a flat site that was surrounded by short green grass. Evidently this is the typical nest type in that habitat. Walkinshaw found older nests only a few meters away from active nests, suggesting a considerable fidelity to specific nest areas by individual birds from year to year.

Egg-laying and Incubation

According to van Ee (1966), the eggs are laid early in the morning, between 6:00 and 9:00, while Walkinshaw (1963) believed they are laid during midday. In two nests studied by Walkinshaw the two eggs were laid two days apart in one case and three days apart in the other. Van Ee found that in all of six nests the eggs were laid on successive days. The first eggs were not covered in van Ee's observations, while Walkinshaw noted that in the nests he studied incubation began with the first egg. Incubation is performed by both sexes, with rather frequent nest exchanges. In one of the nests studied by Walkinshaw the male incubated at night, and the female did so in the other. During three days of observation the male incubated 42.6 percent of the time and the female 54.3 percent. The eggs were left unattended for only 3.0 percent of the total period of observation. However, the eggs were actually incubated only 87.9 percent of the time, with the remainder associated with periods while the bird was standing on the nest. Incubation periods of the male averaged about an hour, and those of the female about 90 minutes.

In van Ee's observations, the male was observed incubating in only two of the six nests studied, and in both cases his activity was irregular. Van Ee observed periods of as long as four hours during which the eggs were unattended, and variations in egg-covering of from 41 to 89 percent of the total time. However, in spite of this, all the eggs hatched in all the nests. The eggs

were turned regularly during daylight hours, from an average of 9 to 21 times a day in different nests. In all cases the incubation period was the same, namely 30 days. Walkinshaw reported incubation periods of from 30 to 33 days for various sources, including both captive and wild birds.

The clutch size of the blue crane is quite consistently of two eggs. Walkinshaw (1963) reported that 26 of 29 clutches were of two eggs, with one of three and two of one. He noted further that the coloration of the eggs varies considerably, especially as to the size and extent of dark streaks and spots, and to a very slight extent the second-laid egg tends to be larger than the initial egg of a clutch.

Hatching of the eggs is essentially synchronous, according to van Ee, with the average time elapsing between the hatching slightly less than three hours. In his observations the hatching always occurred in early morning, between 5:15 and 8:56. Walkinshaw noted that the chicks could be heard within the eggs about 24 hours prior to pipping, and that hatching occurred 12 to 24 hours after initial pipping. The young remained in the nest for about 12 hours normally, but when the chicks hatched on successive days the older chick remained in the nest longer.

Hatching and Postbreeding Biology

Van Ee reported that the first day after hatching was spent in and immediately around the nest, with the male attacking any intruder. On the second day, the chicks began to walk around with their parents, and at this time the female became as aggressive as the male in defending the brood. During the hottest part of the day the chicks would rest in the shade of their parents, flattening their necks to the ground and giving the impression of being dead.

Walkinshaw mentioned that the eggshells from which the young had just hatched were among the first foods offered the chicks. However, van Ee observed no feeding of the young on the day after hatching. On the second day, the female began picking up bits of food and touching the chick's beak with it until the youngster accepted it. He did not see the male bird feeding the young at all. For the first two days, food was provided nearly every five minutes, the female typically touching the chick's bill and uttering a soft *urrrrrrr* sound. This was uttered until the third day. Later, the young birds took food more readily, and soon it would be taken as soon as it was offered. Food-offering was not continued after ten days, at which time the female began to point out food on the ground and let the chick pick it up itself. After fifteen days the young could pick up food without assistance of the female.

The young chicks were observed to be good swimmers, able to cross areas of as much as 35 feet of water.

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Walkinshaw (1963) estimated that the young could fly when about three months old, but van Ee stated that in the case of three broods the fledging required was as little as three months and three weeks to six months. There is thus evidently considerable variation in the rate of growth of chicks.

Van Ee stated that the peeping call of the chicks was retained for more than a year, and that the adult call was first heard when the young were sixteen months old. According to him, the young are cared for until the next breeding season, when they are chased out of the breeding area by their parents.

RECRUITMENT RATES, POPULATION STATUS, AND CONSERVATION

No information is available on recruitment rates in this species. It is the national bird of the Republic of South Africa and is fully protected. According to van Ee

(1981), this species has a healthy population throughout South and South-West Africa and is nowhere endangered in spite of local shooting.

EVOLUTIONARY RELATIONSHIPS

Wood (1979) reported that the blue crane and the demoiselle crane cluster together in all of his analyses except for the "skeletal measurements/humerus length" ratios, apparently because the demoiselle has evolved a humerus that is slightly different from that of other cranes. Collectively, the two species of *Anthropoides* were more often similar to *Grus* (five of eight analyses) than to either *Bucconan* or *Balearica*.

The evolution of these two grassland-adapted species from a common ancestral type can be readily imagined on both ecological and zoogeographic grounds, and I certainly favor the idea that they are congeneric.