January 1983

Cranes of the World: 6. Aviculture and Hybridization

Paul A. Johnsgard
University of Nebraska-Lincoln, pajohnsgard@gmail.com

Aviculture and Hybridization

The keeping of cranes in captivity, either as pets or as animals to be fattened for the pot, is evidently a very old practice. Captive cranes are depicted on the walls of the Temple of Deir-el-Barari of the Nile Valley, where cranes are shown walking in stately fashion between slaves. Each crane's bill is tied down close to its neck, which would upset its balance and thus prevent it from flying away (Whymper, 1909). Armstrong (1979) noted that cranes were apparently domesticated in ancient Greece, and that Plutarch (c. A.D. 46-c. A.D. 120) mentions the nesting of tame cranes, presumably Eurasian cranes. According to Rothchild (1930), a diary of the Moghul emperor Jenangir (1605-1627) mentions the breeding of sarus cranes in captivity. Additionally, crowned cranes were being maintained in Rome by at least as early as the fifteenth century, and a Eurasian crane was maintained for some 40 years by Leonicus Tomaecus, an Italian professor at Padua, at about the beginning of the sixteenth century. Live specimens of the Japanese crane also reached the Vatican by about the sixteenth century, as a gift from Japanese royalty (Topsell, 1972). Cheng (1981) stated that cranes were raised by Chinese royalty as early as the West Chou dynasty, some 2,200 years ago.

Apart from the Eurasian crane, the demoiselle was perhaps the most commonly represented species in European zoos and collections in early years. Bennett (1831) noted that few had reached England by the time of his writing. They were also then rare in France, but toward the end of the seventeenth century the Versailles menagerie contained several individuals that nested there, and one of the young thus produced survived for 24 years. The demoiselle was also successfully bred prior to 1764 at Osterley Park, Middlesex (Hayes, cited by Wiley, 1978).

By the mid-1800s, most of the cranes of the world had been brought into captivity in the major zoological gardens. In 1868, the Zoological Society of London's collection included all the cranes of the world except the hooded, the white-naped, and the then still-undiscovered black-necked crane (*Proceedings Zoological Society of London,* 1868:567). By 1899, the Berlin Zoological Garden was exhibiting all the world's cranes except for the black-necked, the sarus, and the hooded (*loc. cit.* 1900:303), and in 1893 Lord Lilford's private collection was said to include virtually all of the world's cranes (Trevor-Battye, 1903). It is uncertain when the black-necked crane first was brought into captivity, but Delacour (1925) brought the species to Clères, France, in 1924. He suggested that this was the first European importation, although the black-necked crane had apparently been maintained in captivity in the Orient before that time. Archibald and Oesting (1981) have reviewed its avicultural history.

Breeding by captive cranes was attained much less regularly, but at least on the estate of W. H. St. Quinten in northern England the demoiselle was bred by 1903, the sarus by 1911, the Japanese by 1919, and the hooded reportedly nested in 1920 (Moody, 1932). Some of these early nestings were not well documented, but a listing of seemingly reliable early nestings of cranes in captivity is provided in table 21. Hopkinson (1926) provided a fairly complete listing of early breedings of cranes up to the early 1920s, and may be consulted for details.

AVICULTURAL TECHNIQUES

A complete recent review of crane avicultural methods has been provided by Wiley (1978), and the present discussion is based in large measure on his contribution, as well as on those of Sauey and Brown (1977), Archibald (1974), Archibald and Viess (1979), and Larue (1981).

TABLE 21

Early or Initial Breedings of Cranes in Captivity

Species	*Date*	*Reference*
"Black-necked" Crowned Crane	before 1914	Hopkinson, 1926
East African Crowned Crane	1975 (probably earlier)	Steel, 1977
Blue Crane	early 1900s	Hopkinson, 1926
Demoiselle Crane	late 1600s	Bennett, 1831
Wattled Crane	1944	Crandall, 1945
Siberian Crane	1977*	Archibald and Viess, 1979
Australian Crane	1908	Woburn Park records
Sarus Crane	early 1600s	Rothschild, 1930
White-naped Crane	1872	Hopkinson, 1926
Sandhill Crane	1899	Hopkinson, 1926
Whooping Crane	1950†	Allen, 1952
Japanese Crane	1861	Bartlett, 1861
Hooded Crane	1908	King, 1979
Black-necked Crane	Not yet bred‡	—
Eurasian Crane	latter 1800s	Hopkinson, 1926

*Eggs taken from the wild were hatched and chicks reared; first actual breeding in 1981 at International Crane Foundation.
†In semicaptive conditions at Aransas Refuge.
‡This species has been kept at the Peking (Beijing) Zoological Gardens since 1965, and at four other Chinese zoos, but has not yet bred.

Physical Environmental Requirements

Wiley points out that it has been traditional for crane aviculturists to provide as much space as possible for crane pairs, to reproduce their normal territorial spacing patterns as far as possible. However, at the present time, the average crane holding enclosure averages only about 800 square feet. Regardless of the size of the enclosure, visual isolation from adjoining pairs is critical. Cranes are prone to fight through wire fences, often with damage to their wings, breasts, or heads, until a visual barrier is established (Archibald and Viess, 1979). This can be provided by shrub or vine plantings, by placing debris such as old Christmas trees on both sides of a chain-link fence, or by using other opaque barriers. On the other hand, vocal isolation is not needed, and indeed the calls of adjacent pairs may stimulate reproductive behavior. Archibald and Viess stress that each breeding pair must have its own breeding territory, without which it cannot exhibit "confident" behavior that leads to normal breeding. Too much disturbance within the territory can lead to territorial abandonment or absence of nesting attempts altogether. Within the holding areas, a good cover of low-growing foliage, such as grass and weeds, is most desirable, and of course clean water should always be available. However, ponds or marshy areas are not necessary and perhaps are undesirable, as they may harbor disease organisms. In hot or sunny areas, a shade tree is desirable within the territory, and a heap of dried marsh vegetation should be provided for nest construction (Archibald, 1974).

In temperate latitudes of the United States, some special adjustments may be needed for photoperiodic control of breeding behavior. Thus, hooded cranes in Wisconsin have been artificially exposed to photoperiods that were gradually increased from 16 hours to 23 hours, within a two-month period starting the first of March. In 1976 and 1977, among a group of hooded cranes exposed to this light regime, two pairs were stimulated to lay fertile eggs. Apparently the actual intensity of light is less important than the ability to see and continue normal activity patterns associated with breeding for longer periods of the day (Archibald and Viess, 1979). Similar attempts were made to influence the environmental humidity of crowned cranes and Australian cranes, and it was apparent that the incidence of sexual displays was higher among crowned cranes on days of artificial showers (by hose and sprinklers) than on dry days. Similarly the Australian cranes were more active and their facial skin was brighter on wet days than during dry weather.

Nutrition

Wiley (1978) reported that in earlier times the diets of captive cranes were mostly grains and some poultry rations, supplemented seasonally by natural high-protein foods such as insects and fish. At present, several high-protein preparations are available, and these may be useful in stimulating breeding (Archibald, 1974). During the nonbreeding season a low-protein diet of about 16 to 18 percent protein is typically provided, but a higher protein food of 27 to 36 percent is begun about a month

before the breeding season. Natural food items may also be offered at this time, but if these are high in protein this should be taken into account when estimating the total protein intake. Fish, crickets, and mealworms all are excellent high-protein natural foods, and live foods are especially useful in stimulating feeding by the chicks.

Archibald (1974) reported that at the International Crane Foundation newly hatched chicks are fed for the first month of life on a 26 percent protein commercial turkey starter preparation, to which the following are added per 100 grams of this food: corn meal 2,000 grams, vitamin B_1 50 g, magnesium sulfate 25 g, zinc carbonate 15 g, niacin 10 g, pyridoxine 500 milligrams, choline chloride 300 mg, folic acid 250 mg, biotin 50 mg. From 30 days after hatching until the end of the second year, the birds are fed 22 percent protein commercial food (turkey grower pellets). After that they are provided the adult mix, which is 16 percent protein outside the breeding season and 36 percent during breeding. Larue (1981) has provided more recent information on crane diets at the I.C.F., which now uses a 20.5 percent protein diet for breeders, supplemented by ground oyster shell for females. Maintenance diets outside the breeding season have 19.4 percent protein content.

Egg-laying and Incubation

In early years of aviculture, most cranes were normally allowed to incubate their own eggs and raise their own young. The success of this approach depends greatly on favorable weather, freedom from predation or human harassment, and similar conditions. If natural rearing is used, the aviculturist should be aware that in all cranes the eggs hatch at staggered intervals, and thus there is an age difference in the young that might result in sibling strife and possible death of the younger and weaker birds (Wiley, 1978).

In wild cranes, copulation usually begins about a month before egg-laying, and much the same is true of captive birds. Archibald and Viess (1979) reported that during this prelaying period captive females are regularly inseminated artificially to accustom them to human manipulation and to assure egg fertility. Techniques for artificial insemination have been provided by Archibald (1974) and Larue (1980). Gee and Sexton (1979) reported that semen can be effectively frozen and stored in liquid nitrogen for up to at least two months. In the second year of study, egg fertility by this method was 62 percent, and hatchability was 60 percent of the fertile eggs. Artificial insemination done up to eight days before egg-laying is apparently effective in achieving fertility, but if it is done more than ten days before laying, or less than two days before laying, it is apparently ineffective. Gee and Sexton reported that, of eggs obtained from 17 females of nine species, fertility ranged from 44 to 49 percent, and hatchability was from 58 to 91 percent. Rearing success ranged from 62 to 90 percent. Up to ten eggs were obtained in a single season from a female sarus crane (five of which were fertile and resulted in reared offspring), while seven Japanese cranes were raised from eight eggs laid in a single season. Koga (1976) determined that when successive clutches were taken from the nest before incubation, Japanese cranes would lay up to four clutches (rarely nine eggs), and white-naped cranes laid up to eight clutches (to seventeen eggs). Fertility and hatchability did not change significantly throughout the entire egg-laying period of nearly four months. Each egg should be removed as it is laid, and not replaced with a dummy egg, but excessive disturbance should be avoided. A variety of records of relative hatchability and survival of cranes bred in captivity is provided in table 22. Unincubated eggs may be stored in a refrigerator for up to ten days, but should be turned 180 degrees on a daily basis. They should be warmed to room temperature about a day before incubation (Archibald, 1974).

Incubation in artificial incubators or under broody hens provides an alternative to incubation by the parents, and the use of artificial forced-air incubators is probably now the most commonly chosen method. Eggs are incubated in a horizontal position and are turned at rates ranging from every two hours to three times per day. The best incubation temperatures seem to be those providing a relative humidity of 58 to 64 percent, with dry-bulb readings of 99.50 to 99.75° F (37.5-37.6° C) and wet bulb readings of 86-88° F (30-31° C). Within four days of hatching, the eggs are moved to a separate hatching incubator, which has a relative humidity at the saturation point. The eggs are no longer turned after this transfer. The chick is left in the hatcher until it is out of the shell and dried, and then is moved to a brooder. The hatching process usually requires about 36 hours, and the chick should be given assistance only if it has not completed hatching after 48 hours, to avoid damaging the yolk sac (Archibald, 1974). Larue and Hoffman (1981) recommended that the brooder should contain a feather duster for the chick to hide under, bowls for food and water, and a thermometer. The brooder should also have an adjustable floor in order to regulate inside height and to accommodate for growth, and should be covered by a soft carpet or other somewhat pliable surface that will help to avoid the development of crooked toes.

Care of Chicks

For the first few days of life, the weight of the newly hatched chick invariably declines, but by about the

TABLE 22

Hatchability and Survival of Cranes Bred in Captivity

Species	*Eggs Laid*	*Chicks Hatched*	*Young Reared*	*Reference*
West African Crowned Crane	5	5	4	Archibald and Viess, 1979
Blue Crane	10	0	0	Archibald and Viess, 1979
	56	35	23	Guy Greenwell, pers. comm.
Siberian Crane	9	0	0	Archibald and Viess, 1979
Sarus Crane	38	8	8	Archibald and Viess, 1979
	55	36	33	Guy Greenwell, pers. comm.
White-naped Crane	23	4	4	Archibald and Viess, 1979
	114	57	?	Koga, 1976
Whooping Crane	71	16	5	Maroldo, 1980
	42	20	9	Erickson and Derrickson, 1981
Japanese Crane	38	23	15	Archibald and Viess, 1979
	82	33	16	Takahaski and Nakamura, 1981
Hooded Crane	6	6	6	Archibald and Viess, 1979
Totals	549	243 (44.3%)	123 (28.3%)*	

*Excluding Koga, 1976.

TABLE 23

Mean Weights of Crane Chicks during First Week after Hatching*

Species	*Mean Hatching Weight (grams)*	*Subsequent Weights (as % of hatching weight), Successive Days after Hatching*					
		1	*2*	*3*	*4*	*5*	*6*
Crowned Crane†	91.7	85	85	92	95	104	121
Blue Crane	121.3	91	92	89	97	106	118
Demoiselle Crane	73.4	93	89	97	114	130	144
Siberian Crane	121.7	91	88	88	97	108	118
Sarus Crane	134.2	92	93	95	104	115	131
White-naped Crane	116.3	92	93	96	98	101	125
Japanese Crane	132.0	88	91	100	101	117	124
Hooded Crane	113.7	89	87	89	89	102	112
Eurasian Crane	121.1	93	92	94	96	104	114
Average	—	90.4	89.9	93.3	98.9	109.5	123.3

*Calculated from data presented by Archibald and Viess (1979) and Stephen Wylie (pers. comm.).
†Hybrid West African x East African.

fourth or fifth day after hatching, the chick typically reaches and exceeds the original hatching weight (table 23). Once this initial period has passed, the rate of chick growth normally increases rapidly (table 24, figure 12).

Brooding of newly hatched cranes requires a unit having a temperature of between 85 and 95° F, at least for the first few days. Normally the chicks are not fed for the first 36 to 48 hours after hatching, to allow for a complete resorbtion of the yolk sac, but water should be provided to prevent dehydration.

When raising chicks by hand, most aviculturists provide considerable quantities of such animal foods as live crickets, mealworms, bits of fish, ground raw meat, and hard-boiled eggs. Gradually these can be eliminated and a general high-protein chow is adequate. This prepared food, with protein levels of 22 to 26 percent, is used for the first three or four weeks, but too much feeding will result in too-rapid weight gain and possible serious leg problems (Wiley, 1978).

Archibald and Viess (1979) reported that the newly

TABLE 24

Weekly Mean Weights of Crane Chicks, First 10 Weeks after Hatching*

Species	*Mean Hatching Weight (grams)*	*Subsequent weights (as % of hatching weight), by weeks*									
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Crowned Crane†	91.7	121	300	568	1127	1976	—	2524	fledge	—	—
Demoiselle Crane	73.4	144	399	795	1339	1985	2476	2652	2823	2894	fledge
Siberian Crane	121.1	118	253	482	933	1794	2267	2652	2807	3082	3351
Sarus Crane	134.2	131	235	371	680	1146	1464	1882	2477	3129	3998
Lesser Sandhill	104.0	175	443	1052	1442	1695	2096	2373	2526	2684	2867
Florida Sandhill	116.4	193	355	600	972	1027	1748	1972	2352	2531	2651
Canadian Sandhill	103.0	156	347	773	1230	1743	2052	2181	2337	2539	2741
Greater Sandhill	119.2	121	241	539	962	1443	1710	2010	2314	2544	2742
White-naped Crane	116.3	125	220	461	731	985	1242	1709	2190	2527	2832
Whooping Crane	126.0	—	119	387	753	—	1686	2302	—	—	3412
Japanese Crane	132.0	124	294	548	863	1235	1611	1819	2560	2860	3192
Hooded Crane	113.7	112	258	464	778	1074	1554	1886	2193	2413	2681
Eurasian Crane	121.1	114	248	540	1153	—	—	—	2755	2943	3075
Average	—	136	299	644	1017	1421	1836	2150	2488	2740	2973

*Calculated from data presented by Archibald and Viess (1979) and Stephenson (1971); data of latter source (for whooping crane) excluded from average computations.
†Hybrid West African x East African.

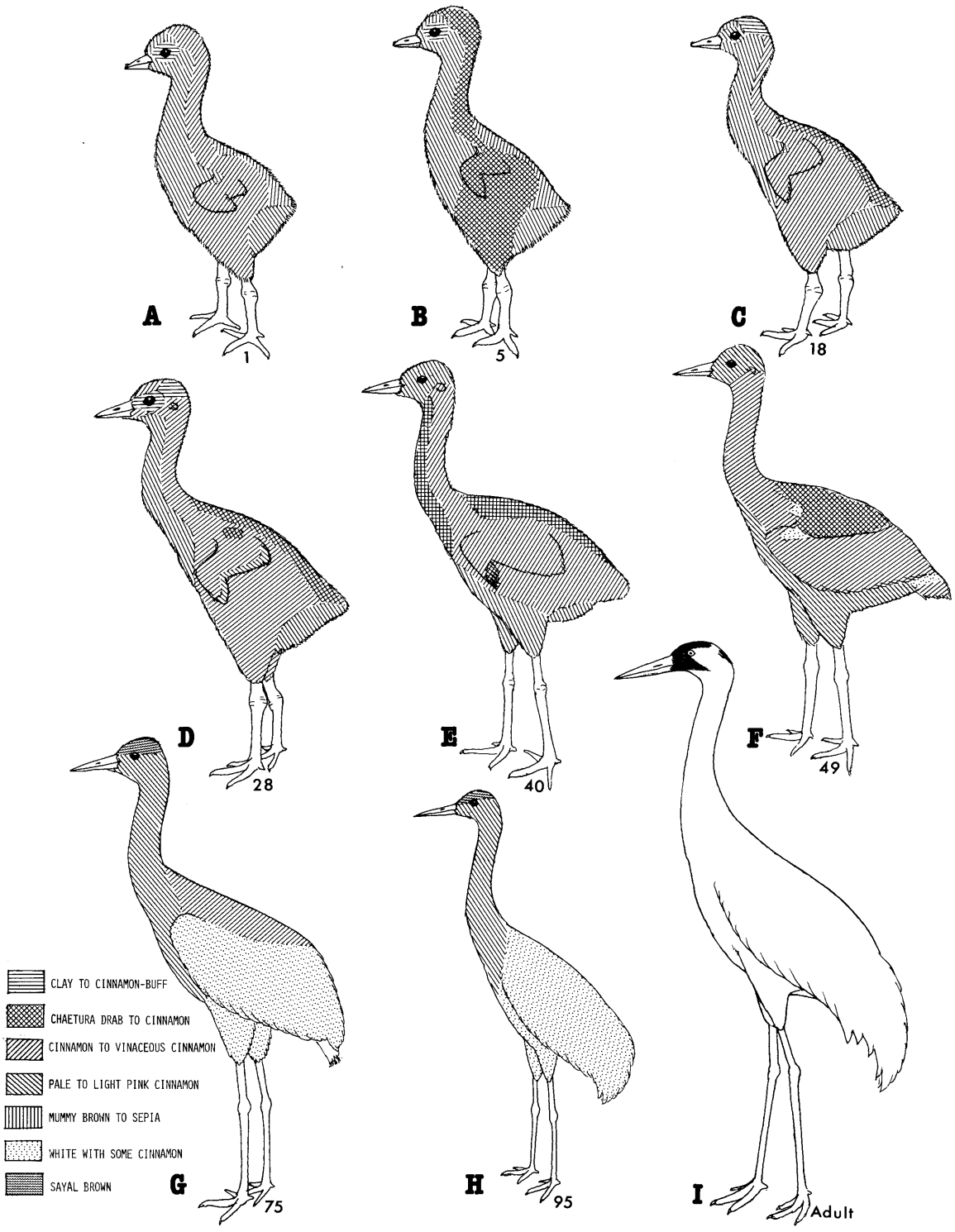
hatched chick is placed in a small and carpeted enclosure, with a heat lamp that keeps the area no warmer than 37.7° C. When no visual contact with other chicks is possible, the cage is provided with a large mirror, so the chick can imprint on its own reflection. A small shallow dish is filled with stones and water, and a second one is provided with a special starter mix. A red dowel is suspended above the second dish to stimulate feeding, with the tip of the dowel just touching the food. The chick is taught to feed by dipping the dowel in water, and then in the food, and finally moving the dowel in front of the chick's head. Several days of such training may be needed before the chick begins to feed on its own. These authors recommend feeding the chick on the second day after hatching.

After the chick has begun to feed on its own, it is moved to a confine that has an inside cement floor with wood shavings, and an adjacent outside confine, again in visual contact with other chicks. During their first week, chicks often develop crooked toes, but these can be treated by bandaging them with a toothpick for support if needed. Such toe problems should be treated as they appear, for otherwise they may be followed by rotation of the entire leg and foot. Lateral displacement of the hock joint may be treated by a pair of plastic bands that are joined by a piece of elastic that provides the proper degree of leg alignment. Medial displacement of the joint is much more difficult to treat, according to Archibald and Viess.

If pinioning is to be done, it should be done at an early age, to avoid too severe stress on the chick. As the bird grows older it should be provided larger areas, and it is desirable to exercise the young birds frequently.

Care of Immatures and Juveniles

Archibald and Viess (1979) reported that the holding techniques for various age-groups of cranes can be



12. Stages in plumage development of whooping cranes during first 95 days after hatching (A-H) and as adults (I). Numbers indicate days after hatching. Not drawn to uniform scale; after Stephenson (1971).

important in managing these birds. Crane chicks are wing-clipped at the time of fledging, and are then placed in a large enclosure with other young birds. These young birds are typically gregarious and show little conflict after a social hierarchy has been established. At the age of 22 months all the potential pairs are separated and placed in individual compounds for possible breeding. Pairing normally occurs soon after this separation, and the area is used by the birds as a breeding territory.

Sexing of cranes is generally quite difficult, as measurements of the sexes almost invariably overlap. Vent-sexing is relatively difficult, although for at least some species it seems fairly reliable in sexing older age-classes (Blackman, 1971a; Tacha and Lewis, 1979). An alternate, albeit expensive, method is that of chromosomal analysis (Sasaki and Takagi, 1981), and fecal samples may be chemically tested for estrogenic or androgenic hormones (Czekala and Lasley, 1977). However, direct observation of the gonads by surgical examination (laparotomy) is probably the simplest and most certain method of establishing the bird's sex, although it does place the bird under some stress. Adults of at least some species may be accurately sexed by a study of sex-specific posturing and vocalizations during the unison call (Archibald, 1974, 1975, 1976).

Initial Reproduction and Longevity of Adults

Although sexual maturity in hand-raised birds typically occurs within about three years of hatching, wild-caught birds often fail to exhibit sexual behavior after many years in captivity, if indeed they ever do. Archibald and Viess (1979) reported obtaining viable semen from three-year-old sandhill, Eurasian, and Japanese cranes, and semen has also been obtained from whooping

TABLE 25

Longevity Records for Cranes in Captivity

Species	*Reported Life-span*	*Reference*
Crowned Crane		
Sudan	15 years, 6 months, 18 days	Flower, 1925
	Average of 20, 84 months	Flower, 1925
West African	Average of 7, 50 months	Mitchell, 1911
South African	28 years	Whipsnade Zoo records
	Average of 14, 43 months	Mitchell, 1911
Blue Crane	At least 22 years, 10 months	Stephen Wylie, pers. comm.
	Average of 8, 58 months	Mitchell, 1911
Demoiselle Crane	At least 27.5 years*	Flower, 1925
	Average of 13, 45 months	Mitchell, 1911
Wattled Crane	At least 36 years (still fertile)*	Conway and Hamer, 1977
	Average of 9, 34 months	Mitchell, 1911
Siberian Crane	Over 61 years, 8 months*	Davis, 1969
	At least 65 years (still fertile)*	George Archibald, pers. comm.
Australian Crane	33 years	Lavery and Blackman, 1969
	Average of 10, 68 months	Mitchell, 1911
Sarus Crane	At least 25 years (still fertile)*	Guy Greenwell, pers. comm.
	Average of 7, 64 months	Mitchell, 1911
White-naped Crane	28 years	Flower, 1925
	At least 45 years (still fertile)*	George Archibald, pers. comm.
Sandhill Crane	24 years, 2 months, 18 days	Flower, 1925
Whooping Crane	40 years	Moody, 1931
	Average of 5, 34 months	Mitchell, 1911
Japanese Crane	25 years, 6 months	Mitchell, 1911
	Average of 8, 59 months	Mitchell, 1911
	3 still alive at 20, 21, & 22 years	Koga, 1976
Hooded Crane	19 years	Whipsnade Zoo records
Eurasian Crane	42 years, 10 months	Mitchell, 1911
	Average of 15, nearly 16 years	Flower, 1925

*Acquired as individuals of unknown age.

TABLE 26

Survey of Cranes Bred or Maintained in Captivity

	*Total Reported Zoo Breedings 1969-1977**	*Average Cumulative Total of Birds Reported per Year*	*Average Number of Zoos Reporting Species per Year*
Crowned Crane			
Hybrids or sspp.?	24	—	—
West African & Sudan	21	—	—
South & East African	54	—	—
Blue Crane	116	—	—
Demoiselle Crane	77	—	—
Wattled Crane	10	66	12
Siberian Crane†	3	10.5	8
Australian Crane	17	27.6	9
Sarus Crane	208	—	—
White-necked Crane	29	54.4	16
Sandhill Crane†			
Greater Sandhill	4	—	—
Mississippi	2	10.8	1
Lesser	1	—	—
Florida	3	51.1	5.8
Cuban	0	1	1
Whooping Crane†	6	15	2.3
Japanese Crane	35	51.5	19
Hooded Crane	2	58.8	19
Black-necked Crane	0	3.3	1
Eurasian Crane	26	—	—

*Based on information in International Zoo Yearbook.
†Some "breedings" from hatching wild eggs included.

TABLE 27

Records of Hybridization among Cranes of the World*

	Blue	*Wattled*	*Australian*	*Sarus*	*White-naped*	*Sandhill*	*Whooping*	*Japanese*	*Hooded*	*Eurasian*
Crowned	C	—	—	—	—	—	—	—	—	—
Demoiselle	C	—	—	—	C	—	—	—	—	C
Blue		—	—	—	C	—	—	—	—	—
Wattled			—	—	—	C	—	—	—	—
Australian				C, W, (F)	—	—	—	—	—	—
Sarus					—	—	—	—	—	C
White-naped						C	—	?†	—	C
Sandhill							C	C	—	—
Whooping								—	—	—
Japanese									—	C
Hooded										W

*C = Captive-bred, W = Wild-bred, (F) = Fertile.
†A reported hybrid may have been a melanistic Japanese Crane (Austin, 1948).

cranes of this age-class (Derrickson, 1980). However, the age of initial successful breeding in 11 male individuals of cranes representing seven species ranged from 5 to 12 years and averaged 7.27 years (various zoo records). Similarly, of 14 female cranes representing ten species, the average age of initial captive breeding was 7.85 years, and the range was 4 to 16 years. A three-year-old female blue crane laid two eggs that proved fertile, although the embryos died before hatching (Christopher Marler, pers. comm.). It is thus clear that many cranes in zoos do not attempt to breed for several years after actual reproductive maturity. Similarly, some birds continue to breed until they are well over 20 years old, and sometimes until they are nearly 40 (table 25). Actual longevity is often much greater than this, especially in the species of the genus *Grus*, as is also indicated in table 25. Thus cranes are one of the more long-lived groups of birds in captivity, and one Siberian crane was known to have survived in excess of 61 years (Davis, 1969).

By the 1960s, all the cranes of the world had been brought into captivity, and as of 1981 all had been bred under captive conditions except for the black-necked crane. Indeed, some species, such as the sarus crane, are now being bred in quite remarkable numbers (table 26), and the zoo populations of this species and of the crowned cranes, the blue cranes, and the demoiselles are probably quite high, although exact numbers are unavailable. Zoo populations of the rarer species in captivity are much better known, however, and not only do such rare species as the Japanese crane, the hooded crane, and the white-naped crane have excellent captive populations but also the success in reproduction under captive conditions is improving constantly.

Hybridization

Hybridization among captive birds has been observed fairly frequently in the crane family, and a summary of hybrid records through the late 1950s was provided by Gray (1958). At that time the only intergeneric hybrid combinations known were one involving the blue crane and the white-naped crane and another between the wattled crane and the sandhill crane. No wild crane hybrids were mentioned in Gray's summary.

In addition to Gray's records, Rutgers and Norris (1970) reported intergeneric hybridization between the demoiselle crane and the white-naped. Furthermore, at least two interspecific combinations have now been reported from wild populations. Several individuals of hybrids between the Eurasian and hooded cranes have been seen on wintering areas of Kyushu, Japan (Nishida, 1981). In addition, in recent years wild hybrids between the Australian crane and the sarus crane have been reported in their area of recent sympatry in northern Australia. Furthermore, this hybrid combination is known to be fertile (Gray, 1958) and may produce introgressive hybridization in Australia (Archibald, 1981b).

A summary of available crane hybridization records is provided in table 27. A supposed hybrid between the white-naped crane and the Japanese crane, a specimen that was originally described as a black-necked crane (Gray, 1958), is probably not an actual hybrid and is perhaps simply a melanistic example of the Japanese crane (Austin, 1948). Hybrids between the sandhill crane and the whooping crane have been obtained only with the assistance of artificial insemination (Derrickson, 1980). Only a single case of hybridization involving the genus *Balearica* has so far been reported. A hybrid produced by a female South African crowned crane and a male blue crane was raised in Pretoria, South Africa, and survived for at least 16 months (*South African Digest*, 11 July 1975, p. 16).