

Storks

fOR MANY DIVERSE HUMAN CULTURES, STORKS are among the most enduringly symbolic birds. The White stork has long been a symbol of pilgrimage and continuity in European and Islamic lands. It nests happily close to people in villages and makes long migrations, but, showing great fidelity, returns to its nest-site on schedule in the spring.

Such reliability has always appealed to humans, and perhaps gave rise to the folk tale (which originated in Germany and Austria but has since spread worldwide) that storks deliver babies. Storks are a reassuring presence wherever they occur.

Birds of Good Omen

FORM AND FUNCTION

The typical storks are large wading birds having long legs, long bills, a stately upright stance, and a striding gait. They are birds of wetlands and water margins, as well as fields and savannas. They prefer warm continental climates and tend to avoid cool and damp regions. As a result, they are widespread in the tropics and subtropics. A few species nest in temperate regions, but they also range into the tropics. The greatest numbers of stork species

are found in tropical Africa and tropical Asia.

White and Black storks are particularly widespread, nesting in Europe, East Asia, North Africa, and southern Africa. Both species spend most of the year in Africa or India. Typical storks also include the adjutants and the giant storks, such as the Jabiru, Black-necked, Saddle-bill, and Marabou, the latter having a wingspan of nearly 2.9m (9.5ft). Except for the Jabiru and Maguari, the typical storks are Old World species.

Storks have long, broad wings and are strong fliers. They fly with their necks outstretched, except for the adjutants, which retract the head. Storks can engage in remarkable aerobatics, such as diving, plummeting from the sky, and flipping over in flight. The Black stork, having relatively narrow wings, relies on flapping flight to a degree that is unusual in the family. Most storks alternate flapping flight with soaring on warm air-currents (thermals).

The bills of typical storks are long and heavy. Most are straight, although the massive bill of the Jabiru is slightly up-curved. They are used to take a wide variety of aquatic and terrestrial prey, which the birds obtain by walking slowly or standing. A typical stork will walk slowly across fields with its



Above Despite being widespread throughout most of its range, the Black stork tends to avoid areas of human activity. It prefers forest, where it feeds on fishes and aquatic invertebrates in marshy clearings or stream edges.

Below Painted storks, indigenous to South and Southeast Asia, are renowned for their large colonies. For example, in 2002, no fewer than 5,000 birds gathered to nest, under the active protection of villagers, at the hamlet of Veerapura in southern India.



neck extended and head down, looking for prey. The huge bills of the giant storks allow them to take large prey. The Black-necked stork sometimes hunts by running back and forth, jumping and flashing its wings. The Jabiru, the largest New World stork, feeds by touch, wading slowly and periodically inserting its open bill into the water. The huge bills of the adjutant storks are used for cutting, prying, and tearing, as well as being effective against competitors at the feeding site.

The wood stork tribe includes species having downcurved, ibis-like bills and also the related open-bill storks, which, as their name implies, have a visible gap between their mandibles. Except for the American wood stork, these are Old World species; they are birds of the tropical swamps, where seasonal rainfall leads to water-level fluctuations and large aquatic snails occur in abundance. The four wood storks feed by touch, wading slowly with their partially opened bills inserted in shallow water, the bill snapping rapidly shut when triggered by the feel of a fish. They are particularly effective at catching fish when they are concentrated, generally by falling water levels.

The bill of the open-bill storks is used for dealing with mollusks, especially large water snails. The bill-tip is inserted into the opening of the shell, cutting the snail's muscle, which permits extraction of the body. An open-bill may ride on a swimming hippopotamus to capture the snails it stirs up.

Wood storks, adjutants, and the Jabiru lack feathers on their heads. The sexes look similar,

but males are noticeably larger than females. Dark irises distinguish male Black-necked and Saddle-bill storks from the yellow-eyed females. Air sacs lie under the neck skin, and the Marabou and the Greater adjutant have long, bare, pendent throat sacs. Juvenile plumage is dull, reaching full development over the first year. Nestlings of the otherwise white Maguari stork are black, probably serving as camouflage. The African open-billed stork is black, whereas the closely related Asian open-billed stork is white. The colors of the bill, together with the bare skin of the head and legs, are characteristic for each species, and the color of these hallmarks intensifies during courtship. For example, the breeding Maguari stork has a striking blue-gray bill, becoming maroon near its red face. The Jabiru has a pink neckband that changes to deep scarlet whenever it is excited.

Temperate breeding storks, and some in the tropics, undertake seasonal population movements, although movements of tropical species tend to be less long-distance migrations than population shifts in response to rainfall patterns affecting feeding conditions. In contrast, the migrations of European storks have been known since biblical times. The birds' reliance on thermals, which tend to be found over land, restricts routes, as they can only manage short flights over water. In consequence, European Whites use two migratory routes southward to Africa, one down the Iberian Peninsula, the other across the Middle East through Egypt, both of which avoid a long sea crossing over the Mediterranean.

Hunters and Scavengers

DIET AND FEEDING

Most storks feed alone or in small groups, but will also form large flocks when food is abundant, a behavior that is particularly common in the wood storks. The White-bellied stork also often hunts in large flocks, especially near grass fires and locust swarms.

By soaring, storks can forage at long distances from their colonies and roosts. The White stork, wood storks, and adjutants are particularly adept at reaching high altitudes, and then gliding toward distant feeding sites. This behavior helps birds to locate food concentrations, where many birds may forage together. In East Africa, as many as seven stork species may feed in the same location.

The diet of most storks is varied. The White stork's includes aquatic vertebrates, insects, and earthworms, but on its African wintering ground the species is known as the Grasshopper bird, from its habit of following locust swarms. White storks also opportunistically follow mowing machines. Wood storks and open-bills are specialized storks with a much narrower range of prey.

The Greater and Lesser adjutant storks and the Marabou are largely scavengers and carrion-eaters. They are well known for their attendance at carcasses, along with vultures and hyenas; the Greater adjutant, which was formerly common in Indian cities, consumed refuse that included human corpses. Although not adept at tearing flesh, their size and large bills enable them to steal morsels of meat from

FACTFILE

STORKS

Order: Ciconiiformes

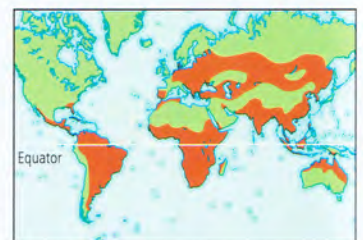
Family: Ciconiidae

19 species in 6 genera

Distribution Worldwide, in temperate and tropical areas

TYPICAL STORKS

Tribe Ciconiini
13 species in 4 genera: **Black stork** (*Ciconia nigra*), **White-bellied stork** (*C. abdimii*), **Woolly-necked stork** (*C. episcopus*), **Storm's stork** (*C. stormi*), **Maguari stork** (*C. maguari*), **White stork** (*C. ciconia*), **Oriental white stork** (*C. boyciana*), **Black-necked stork** (*Ephippiorhynchus asiaticus*), **Saddle-bill stork** (*E. senegalensis*), **Jabiru stork** (*Jabiru mycteria*), **Lesser adjutant stork** (*Leptoptilos javanicus*), **Greater adjutant stork** (*L. dubius*), **Marabou stork** (*L. crumeniferus*).
Tropical and temperate zones of the Old World, with 1 tropical American species. **Size:** Length: 75–150cm (30–60in); weight: 0.9–7.4kg (33–259oz); males in most species are larger than females. **Plumage:** Chiefly white, gray, and black. **Voice:** Generally silent, although many have a variety of calls when nesting including, according to species, mooring, whistling, and bill-clattering. **Nest:** Large structures of sticks and other materials, including turf and green twigs; those of the European White stork may be reused and become several meters in depth. **Eggs:** Usually 1–4 eggs, up to a maximum of 7; chalky white. Incubation 29–38 days; nestling period 55–115 days. **Diet:** A wide variety of fish, aquatic insects, and other invertebrates; for some species,



terrestrial insects, especially locusts. **Conservation status:** Storm's stork, the Oriental white, and the Greater adjutant are Endangered; the Lesser adjutant is Vulnerable.

WOOD STORKS

Tribe Mycteriini
6 species in 2 genera: **American wood stork** (*Mycteria americana*), **Milky stork** (*M. cinereus*), **Yellow-billed stork** (*M. ibis*), **Painted stork** (*M. leucocephalus*), **African open-bill stork** (*Anastomus lamelligerus*), **Asian open-bill stork** (*A. oscitans*). Tropical zones of the Old World, with 1 species in tropical America. **Size:** Length: 80–105cm (32–41in); weight: 1–3.4kg (40–118oz); males are larger than females. **Plumage:** 5 species are white (2 having pink tones), and 1 species is black. **Voice:** Generally silent except in colonies, where they give honking or hissing calls. **Nest:** Large structures of sticks. **Eggs:** Clutch size 1–5; chalky white. Incubation 25–32 days; nestling period 35–65 days. **Diet:** The wood storks (*Mycteria*) are specialized fish eaters, while the open-bill storks (*Anastomus*) specialize on snails. **Conservation status:** The Milky stork is Vulnerable.





Above Representative species of storks:
1 African open-bill stork (*Anastomus lamelligerus*);
2 American wood stork (*Mycteria americana*);
3 Marabou stork (*Leptoptilos crumeniferus*); 4 White
stork (*Ciconia ciconia*)

nearby vultures. Marabous frequent predator kills, domestic stockyards, plowed fields, and rubbish dumps, as well as haunting drying pools that contain the natural prey necessary to raise young. The birds are also attracted from great distances to grass fires, where they march along the fire front. The size range of their prey varies greatly; they will stand at termite mounds eating swarming insects, yet also take quite large prey, killing young crocodiles, young and adult flamingos, and small mammals.

Solitary or Colonial

BREEDING BIOLOGY

The nesting cycle of all storks is strongly seasonal, apparently determined by food supplies. Only the White and Black storks regularly leave the tropics to nest, doing so during the temperate spring and summer. The American wood stork nests during the dry season, when prey are concentrated in drying pools and are easily captured by touch, as does the Marabou, as carrion also becomes available. Other species of wood storks nest during the wet season, also the time of maximum prey abundance. The White-bellied stork is considered a "rain bringer" in Ethiopia, in that it nests during the first heavy rains, which produce a flush of its insect food.

Wood storks, open-billed storks, adjutants, and the White-bellied stork all nest colonially, together and with other species of waterbirds. Other species, such as the White and Maguari stork, are either loosely colonial or solitary. The giant storks tend to nest alone. American wood stork colonies may exceed tens of thousands of nests, whereas many European villages have only a single White stork family nesting there.

Most storks nest in trees, but they may also use cliffs or nest on the ground. Non-colonial tropical species, such as Saddle-bill storks, may remain paired year-round, and White storks often pair up with the same mate again because both birds are attracted to the nest site of the previous year. Nests are situated near sites providing suitable food supplies: drying pools for American wood storks; carrion-producing rangeland for marabou; agricultural fields for White storks.

The nest site, selected by the male, is defended against all intruders. The male gives advertisement displays, and the attracted female responds with appeasement behavior (see Up, Down, Flying Around). Advertising displays differ between species, but typically consist of up-down movements, calls, and bill clattering. In one extreme display, a stork bends its neck backward until its head touches its back; in some species, this posture opens a resonance chamber in the throat that amplifies the sound of the snapping of the bird's two mandibles. Even newly-hatched young behave in this way.

Both parents incubate and feed the relatively helpless young by regurgitating food onto the floor of the nest. Storks may also regurgitate water



Above Jabiru storks build conspicuously large nests, which the birds add to every year when they return to nest. This species occurs in suitable habitat (savanna, coastal lagoons) from Mexico to northern Argentina.

Below The bills of storks are perfectly shaped for trawling through shallow water for fishes and amphibian prey. Here, a Woolly-necked stork captures a plump frog, a substantial meal.

over their eggs and young, presumably in order to cool them. Nesting success is determined by the availability of prey items and weather conditions; indeed, wood storks only fledge young when high densities of food remain available throughout the entire nesting season. The nesting success of White storks is poor in years or locations having very high rainfall.



Declining Numbers

CONSERVATION AND ENVIRONMENT

Some stork populations have undergone massive declines. Even the White stork, long regarded as a harbinger of good fortune and many children, has suffered. Between 1900 and 1958, western European populations decreased by 80 percent, and by 92 percent between 1900 and 1973. Storks no longer nest in Sweden or Switzerland, and occur only in small numbers in other countries.

The reasons for the decrease are not certain, but those that have been proposed include cooler and wetter summers, loss of nest-sites, pesticide poisoning, hunting on the winter grounds, and changing agricultural practices. The last hypothesis is lent credence by the fact that, although stork numbers in Europe previously increased following deforestation, they have more recently suffered a steady decline, as more and more foraging sites have fallen victim to the demands of modern agriculture. Hunting pressure in wintering areas in Africa may also be a contributory cause of their decline.

The Greater adjutant population has been critically reduced throughout its range. The Milky stork, confined to the mangrove forests of Southeast Asia, is in jeopardy because of habitat destruction. Some species, such as the Black-necked stork, are now rare over wide ranges, while others, such as the Asian open-bill stork, are still numerous, but only locally. Although it remains abundant elsewhere throughout its range, the American wood stork has decreased in southern Florida as a result of ecological changes in the vast Everglades marsh that have prevented the birds from finding enough food to raise their young. In general, protection of wetlands and other feeding sites is essential for stork conservation.