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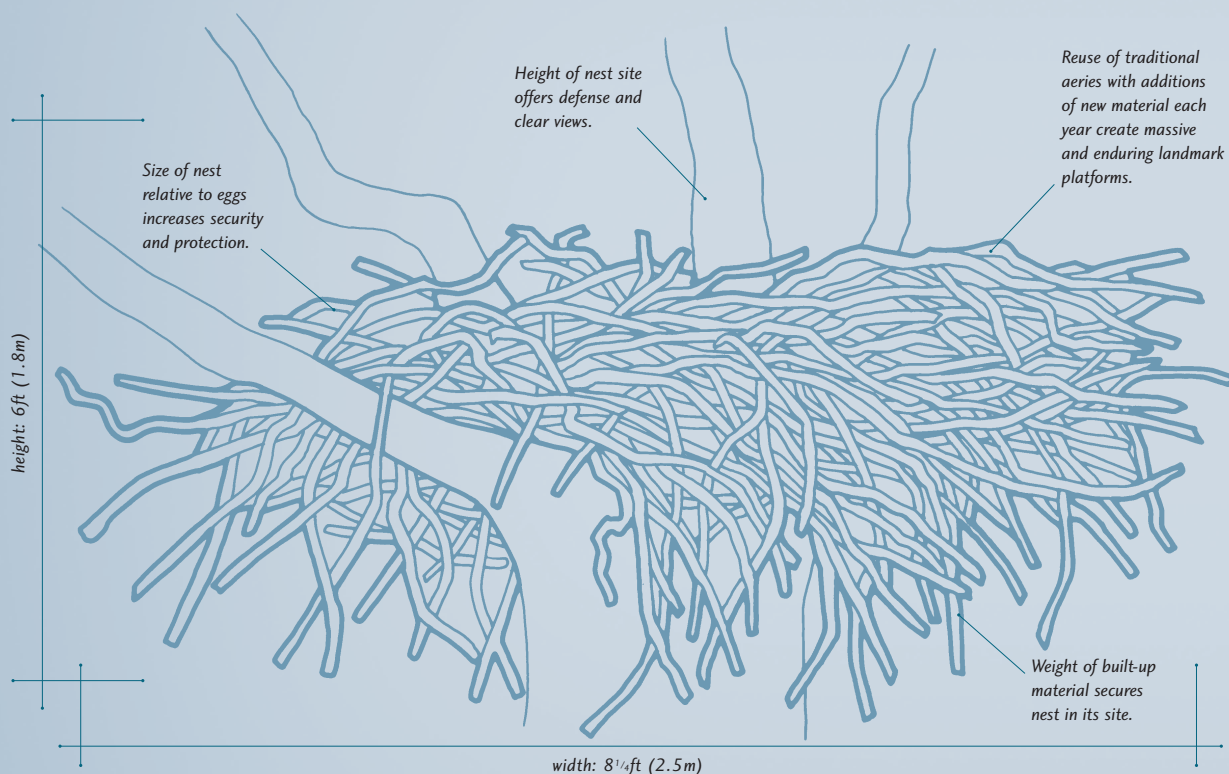
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BLUEPRINTS

Platform Nest Structures

The simplicity of the architectural blueprint for the piled-up platform nest is deceptive, as it creates some of the most monumental and enduring structures in the avian world. Birds of prey including eagles, kites, and ospreys build platforms, as do herons, egrets, storks, and spoonbills. The Common Woodpigeon (*Columba palumbus*) makes a rough lattice pattern, while the Magpie Goose (*Anseranas semipalmata*) creates a well-matted platform.



**FIG. 1
HIGH, HEAVY
PLATFORM**
The Bald Eagle (*Haliaeetus leucocephalus*) commonly forms its nest in a tree or on a cliff. The platform has good visibility

and space for a clear takeoff, and is just a few hundred yards from water. In the north of its range, the nest site may be 80ft (24m) or more high, but it is no more than 20ft (6m) high in

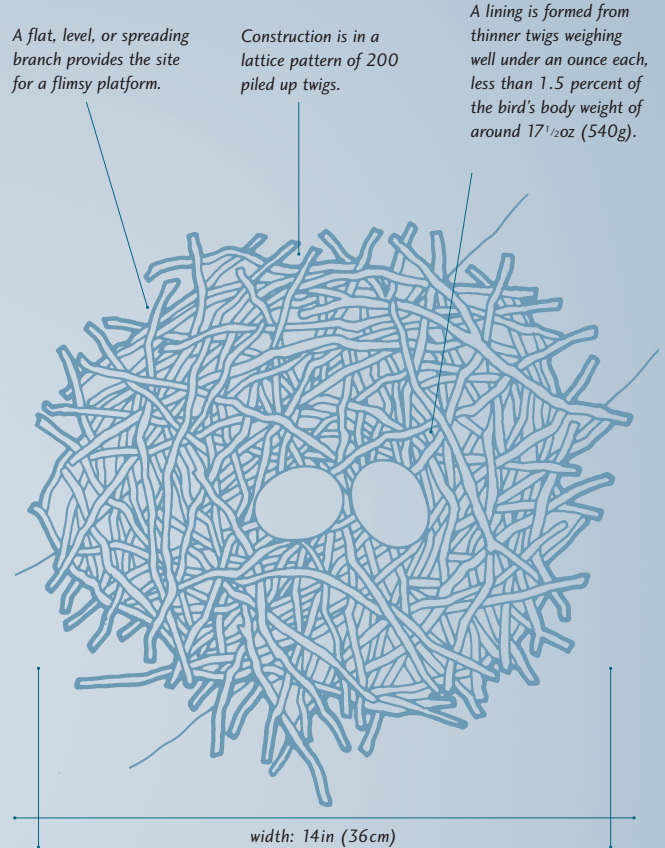
the Florida mangrove swamps. In the treeless Aleutian Islands, Bald Eagles nest on the ground. Small sticks are picked up or broken off and carried in the beak; large ones are carried in the

talons. In the center of the platform a cup 3–5in (7.5–13cm) deep, lined with grass and mosses, is formed. Large nests can weigh two tons and last for over 50 years.

FIG. 1 BALD EAGLE NEST

VARIETIES OF STRUCTURE

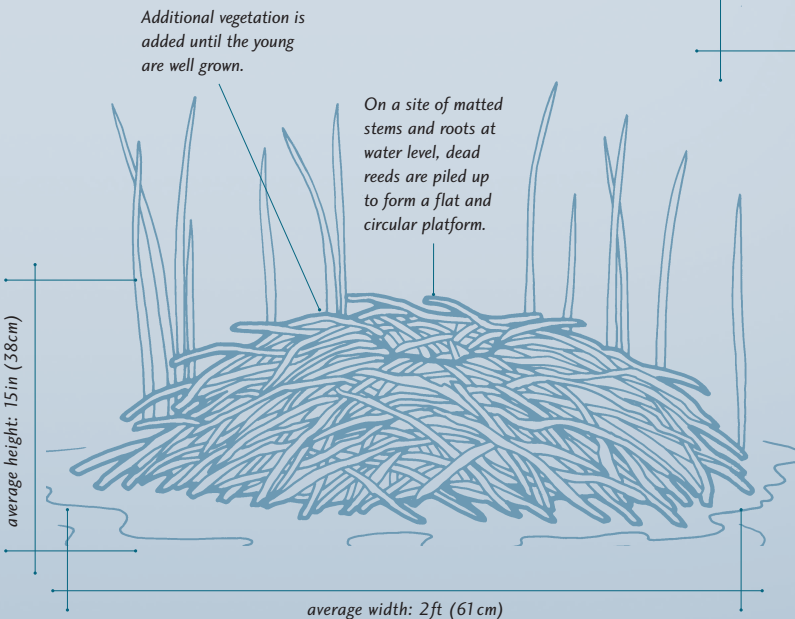
Enormous platform nests are built at dizzying heights in trees or on cliffs using branches, sticks, and twigs. Platforms are also constructed in water using reeds. Structures may be lined with grass, mosses, fine twigs, leaves, wool, and artificial materials. The simplest platforms are unbound but some birds, such as the White Stork (*Ciconia ciconia*), utilize a cement of earth, turf, and dung.



**FIG. 2
PILED LATTICE
PLATFORM**

The platform of the Common Woodpigeon is constructed from about 200 twigs up to 8 in (20 cm) long piled one on top of another in a rough lattice pattern. There is a lining of thinner but not

necessarily shorter twigs. Early in the season, nests are commonly in ivy or evergreen trees, while later broods are often hidden in the leafy shrub layer of hazel, elder, hawthorn, or honeysuckle trees.



**FIG. 3
REED BED
PLATFORM**

The nest of the Great Bittern (*Botaurus stellaris*) is built among the previous year's reeds. The female Bittern collects a loose heap of dead reeds, mostly from nearby, until it forms a circular, rather flat

platform resting on matted vegetation. It is lined with a little finer vegetation. The male attracts one or more females into his territory; whichever female he mates with builds the nest, incubates the eggs, and rears the young.

FIG. 2 COMMON WOODPIGEON NEST | FIG. 3 GREAT BITTERN NEST

MATERIALS AND FEATURES

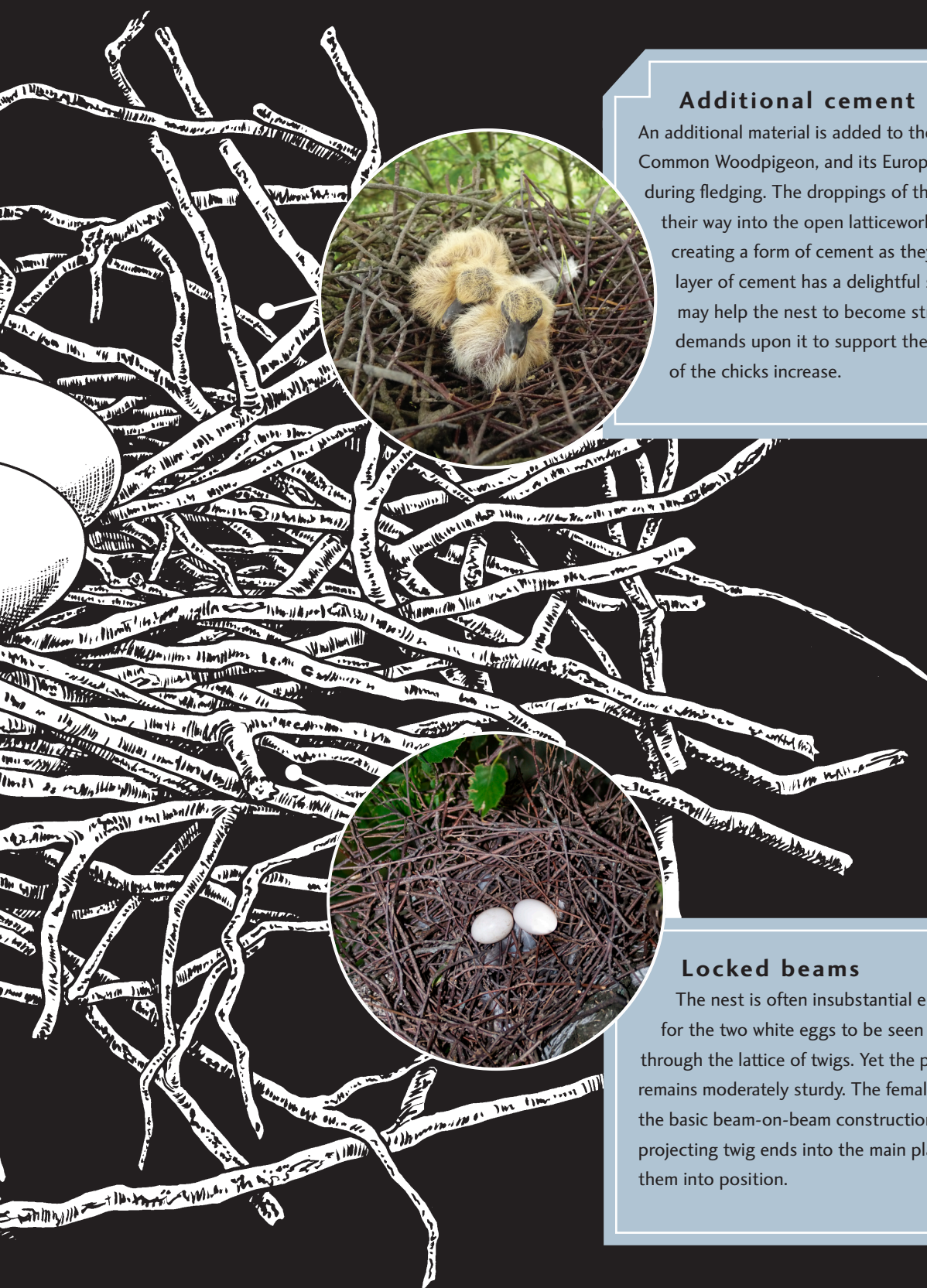
Common Wood Pigeon Nest

Common Woodpigeons (*Columba palumbus*) nest throughout wooded Europe, building rickety nests from twigs in the fork of a tree (often a horizontal one). Evergreens or ivy provide sites early in the season; leafy trees, such as hawthorn, blackthorn, and elder, later. The nest is on average $9\frac{3}{4}$ – $16\frac{1}{4}$ ft (3–5 m) above the ground. An English nest in a hawthorn from which the two young had just fledged measured 10 x 14in (25 x 36cm). It was faintly concave, without a definite cup, but the center of the dip had finer twigs as a slightly softer lining. Almost all the twigs were of Silver Birch, which was the tree whose canopy overhung the hawthorn. Many of the twigs had multiple branches and were locked together. Outer twigs were bent around and pushed into the platform and the whole was cemented together with the young's droppings. At this stage it weighed 9oz (255g). A new nest commonly weighs closer to $5\frac{1}{4}$ oz (150g).

Precise materials

The behavior of the male suggests that precise selection of materials is essential. Twigs are mostly brought to the nest site by the male. When searching for these on the ground, he picks up and drops twigs repeatedly before making a choice. He also expends much effort twisting and tugging selected twigs to break them off the tree. The male brings the twigs in his bill to the female. She does the building, laying out the twigs one on the other, “beam” upon “beam,” as she turns around.





Additional cement

An additional material is added to the nest of the Common Woodpigeon, and its European relatives, during fledging. The droppings of the chicks work their way into the open latticework of the platform, creating a form of cement as they dry. This growing layer of cement has a delightful symmetry as it may help the nest to become stronger as the demands upon it to support the growing weight of the chicks increase.

Locked beams

The nest is often insubstantial enough for the two white eggs to be seen from below through the lattice of twigs. Yet the platform of beams remains moderately sturdy. The female adds rigidity to the basic beam-on-beam construction by bending the projecting twig ends into the main platform to lock them into position.

Building a Reed Platform

The Magpie Goose (*Anseranas semipalmata*) is in a waterfowl family on its own, most closely related to screamers and whistling ducks. It is found in the swamps, mangrove flats, and floodplains of northern, tropical Australia. The birds breed just after the wet season, generally in March to May, but as early as January or as late as June, depending on the rains. If the wet season fails, they will not breed. Generally, the nest site is near the middle of a swamp. Magpie Geese nest colonially. The male builds the nest using rush or reed stems to build a platform. Some males have two mates; 5–14 eggs may be laid, and all three birds help to raise the young.

1. The Magpie Goose nest site is in the middle of a swamp, and the male bird begins construction by bending down and piling up rooted rush stems.



2. The reed stems are clutched in the beak and folded down one at a time to construct a circular, open platform.



3. The Magpie Goose rotates as it engineers the circular platform.



4. The rotation of the bird effectively weaves the reeds into a radial pattern to give the nest added strength.



LEFT MAGPIE GOOSE

The Magpie Goose is a large, pied bird with a wingspan of up to 5 $\frac{1}{3}$ ft (162cm). Its long, yellow legs have only partially webbed feet. Unusually for a goose, it often perches in trees.



6. The bird tramples down the reeds with its feet to build an increasingly bulky and solid platform.

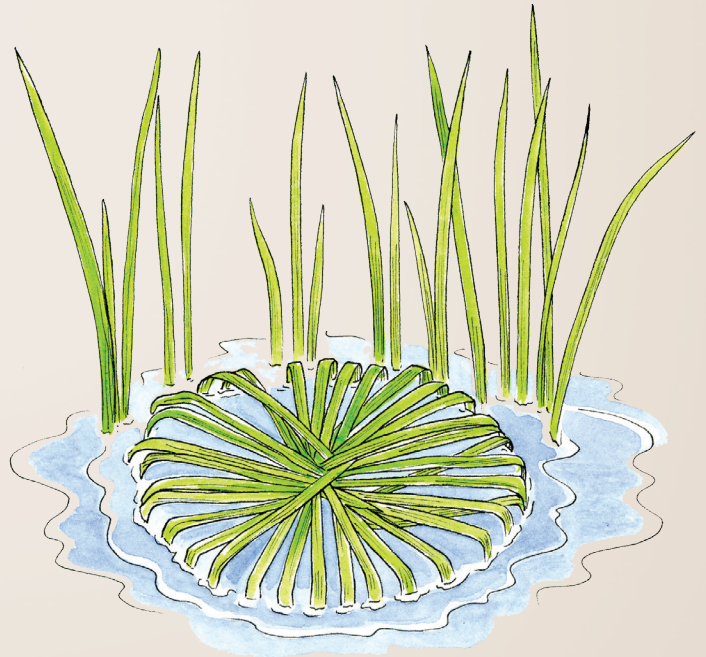


5. Sometimes the male Magpie Goose will bend several stems at once by catching them in the crook of his neck.



8. The final platform is a trampled-down tussock of vegetation half floating in water up to 3ft (1m) deep. The nest has a deep cup at the top to hold the eggs.

7. The combination of architectural techniques creates a semi-floating platform supported by the standing plants.



ROTATION

The laying of the stems is engineered in a careful rotation, which results in a well-matted platform.

CASE STUDY

Golden Eagle



The Golden Eagle constructs a vast platform nest high in a tree or on the ledge of a cliff. It competes successfully for prime sites, and particular crags have been used by successive pairs for up to a century. Found across the Northern Hemisphere, from northern Siberia and Alaska south to the European Alps, Mexico, and the Himalayas, the Golden Eagle nests in several sites within its territory.

Nest and habitat

Eagles and other large raptors are unique in having a specific name for their nest—the aerie or aery. This is built either on the ledge of a cliff or on a tree, often at the crown. A pair of birds usually have two or three nests. Some pairs exclusively have crag nests, others always trees, and some use both. Observers have recorded as many as 10 sites for a single pair.

Nest construction

Golden Eagles are known to live for about 20 years, and they pair for life. The pair share the nest building and may build at more than one site in a year. When first constructed, a cliff nest is little more than a scrape surrounded by a ring of sticks up to 1²/₃in (4cm) thick, with a lining of a little grass, heather, wood rush, wool, and leaves. It is added to each consecutive year, until it reaches 3¹/₃–10ft (1–3m) in diameter and 6¹/₂ft (2m) tall. The hen probably does most of the building, picking up or breaking off sticks, pulling up grass and heather, and piling up the profuse material. Tree nests can become huge, as wide as 8–10ft (2.4–3m) across and 17ft (5.2m) deep. Two eggs are laid, but in 80 percent of nests only one chick survives to fledging.

Nest adornment

As the breeding season goes by the birds add sprays of green vegetation predominantly from pine trees, but almost any greenery if pine is not available. The reason is disputed. It may be to introduce clean material; to employ insecticidal and antibacterial properties; or, as the late David Bannerman put it, to add “a touch of beauty to the structure.”

Classification

ORDER	Falconiformes
FAMILY	Accipitridae
SPECIES	<i>Aquila chrysaetos</i>
RELATED SPECIES	Other <i>Aquila</i> eagles, hawks, vultures, harriers
NEST TYPE	Platform
SPECIES WITH SIMILAR NESTS	Herons, egrets, storks
NEST SPECIALIZATION	Huge nests on multiple sites



LEFT

CRAG NEST

The powerful Golden Eagle can lay claim to prime cliff sites, which can provide nests for decades. The size of the cliff ledge dictates the nest's size. The nest may stretch along the ledge and have a cup formed in a different place each year. This crag nest demonstrates the good visibility afforded by a prime site, and the space around the aerie which enables the adult with its 6–7¹/₂ft (1.9–2.3m) wingspan to take off easily.



LEFT

NEST ADORNMENT

Tree nests start as a shallow platform of sticks and have a lined cup, especially with wood rush, but also grass and heather. This adult standing with its chick is on a nest near Konny Dvor, 175 miles (280km) northeast of Minsk, Belarus. It shows the green pine branches that are often added to the platform.

CASE STUDY

White Stork

Man-made architecture commonly forms a towering foundation for the White Stork to construct its highly distinctive and attractive nest. Gregarious summer visitors to Europe, North Africa, the Middle East, and southwest Asia, they winter in sub-Saharan Africa and India. White Storks construct extravagant, sprawling platforms that they reuse and extend each season.



Nest and habitat

In the wild, White Storks build nests on trees and cliff ledges, while in towns and villages they characteristically build on roofs, towers, ruins, chimneys, utility poles, and man-made platforms erected on poles. A drive along a main road in Tunisia can be marked by nest after nest located on electricity pylons, built on the steel platforms at the very top.

Nest building

In the breeding season, the male White Stork usually arrives first and chooses a site or reclaims the nest from the previous year. He defends it vigorously and starts to build or repair it, assisted later by the female. The nest takes the form of a huge pile of dead branches and sticks up to $1\frac{1}{3}$ – $1\frac{1}{2}$ in (3–3.75cm) thick. The materials are glued together with earth, turf, and dung, all collected and carried with the bill from as far as $\frac{1}{2}$ mile (800m) away. The central depression is lined with twigs, grass, and sometimes artificial materials. A new nest can be finished in eight days and measure $2\frac{2}{3}$ –5ft (80–150cm) across by 3–6ft (90–180cm) deep, but one used over many years may become nearly twice as big.

Associated nests

Older storks' nests are so deep that Spanish Sparrows (*Passer hispaniolensis*) or House Sparrows (*Passer domesticus*) may add their own untidy, domed nests of grass lined with feathers around the bottom. The chirping small birds do not seem to trouble the rightful owners of the main nest, although they can be very aggressive toward other storks that come too close.

Classification

ORDER	Ciconiiformes
FAMILY	Ciconiidae
SPECIES	<i>Ciconia ciconia</i>
RELATED SPECIES	Bitterns, herons, egrets, ibises, spoonbills
NEST TYPE	Stick platform
SPECIES WITH SIMILAR NESTS	Relatives except bitterns
NEST SPECIALIZATION	Huge nest on man-made structure



**LEFT
TOWERING
PLATFORM**

The nest of these White Storks is at the top of the tower of the necropolis of Chellah, at Rabat, Morocco. It has clearly been used for several years, as its size testifies. The size of the nest and the stork can be measured by the sparrows perched on the right, whose own nest may be constructed at the bottom fringes of the stork's nest. The combination of man-made and avian architecture creates one of the great spectacles of the natural world.

CHAPTER FOUR

Aquatic Nests



Specialist architects are required to build on water, which places unique demands on the nest-building techniques while also offering immediate protection from land-based predators. Birds from only four families construct truly aquatic nests: jacanas, marsh terns, grebes, and rails.

These architects build using aquatic plant materials that generally contain air spaces. When detached from the base, the plants tend to float—even the rotting stems and leaves. Two building styles are employed. Substantial mounds are piled up and either rest on the bed in shallows or form floating islands in deeper water. Lightweight rafts of plant material offer a less sturdy floating structure. In both cases, surrounding plants offer convenient anchors.

Aquatic nests have several advantages. The water acts as a protective moat and the nests may be well hidden; for example, grebes breed by lakes, pools, or calm streams, bordered by vegetation that conceals the nest. A floating nest can also rise and fall with changing water levels. However, aquatic nests can be destroyed in bad weather or left high and dry by drought. An incubating coot may sometimes knock eggs out of the shallow cup of its nest. When an incubating jacana stands up, the movement often thrusts the eggs out of the flimsy nest and into the water.

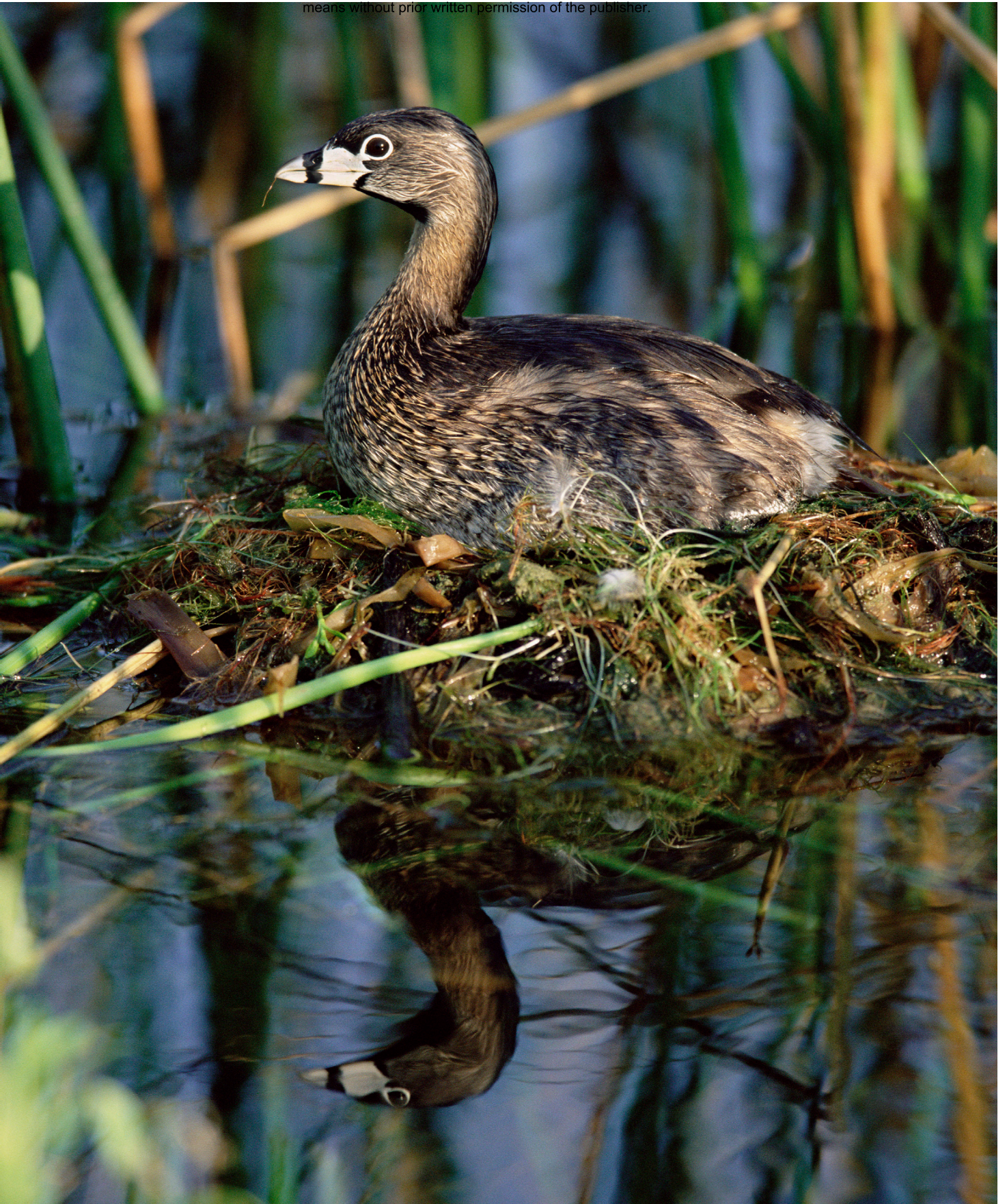
To minimize their vulnerability, the young in aquatic nests hatch in a highly developed state and the breeding pair are very protective. The chicks become independent quickly and they leave the nest early.

The eight species of jacanas, or “lily trotters,” have unusually long toes and claws that enable them to walk across floating vegetation. And that is the form their flimsy nests take. That of the Pheasant-tailed Jacana (*Hydrophasianus chirurgus*) was described in 1952 by the naturalist W. W. A. Phillips as: “A few floating waterweeds piled together to form a small blob almost awash.”

Marsh terns, found breeding as summer migrants in marshes and swampy grasslands by areas of open water, construct floating nests of varying degrees of strength, and also adopt the old nests of birds and mammals. Grebes can engineer more substantial structures. Clumsy on land, they need to swim right up to the nest. They dive to pick up rotting vegetation, which is then either built up from the bed of shallow water or anchored to surrounding reeds. The nest is trampled at the top to form a shallow cup.

The nest of the Eurasian Coot (*Fulica atra*), a rail species from Europe, is also a substantial aquatic structure piled up in the shelter of reeds, rushes, or cattails. Ornithologist Howard Saunders in 1899 recorded a nest firm enough to support a seated man who was up to his knees in water.

RIGHT
PIED-BILLED GREBE NEST
A Pied-billed Grebe (Podilymbus podiceps) incubates its eggs on an aquatic nest in Texas.



BLUEPRINTS

Aquatic Nest Structures

Aquatic nest blueprints take two main forms, the mound piled up from the bed of the site, and the true floating nest. A key engineering technique is the anchoring of the nest material to submerged vegetation. Aquatic structures are found in four families: the gallinules, rails, and coots (Rallidae, about 140 species); the grebes (Podicipedidae, around 20 species); jacanas (Jacanidae, 8 species); and the marsh terns (part of the Laridae, 3 species).

**FIG. 1
PILED-UP
MOUND**

A bulky, cup-shaped mound of dead leaves and waterside plants forms the Eurasian Coot's (*Fulica atra*) nest. It is built among growing vegetation in or by fresh water, and the material is piled up, mainly by the female. The male builds extra platforms for the young to rest on.

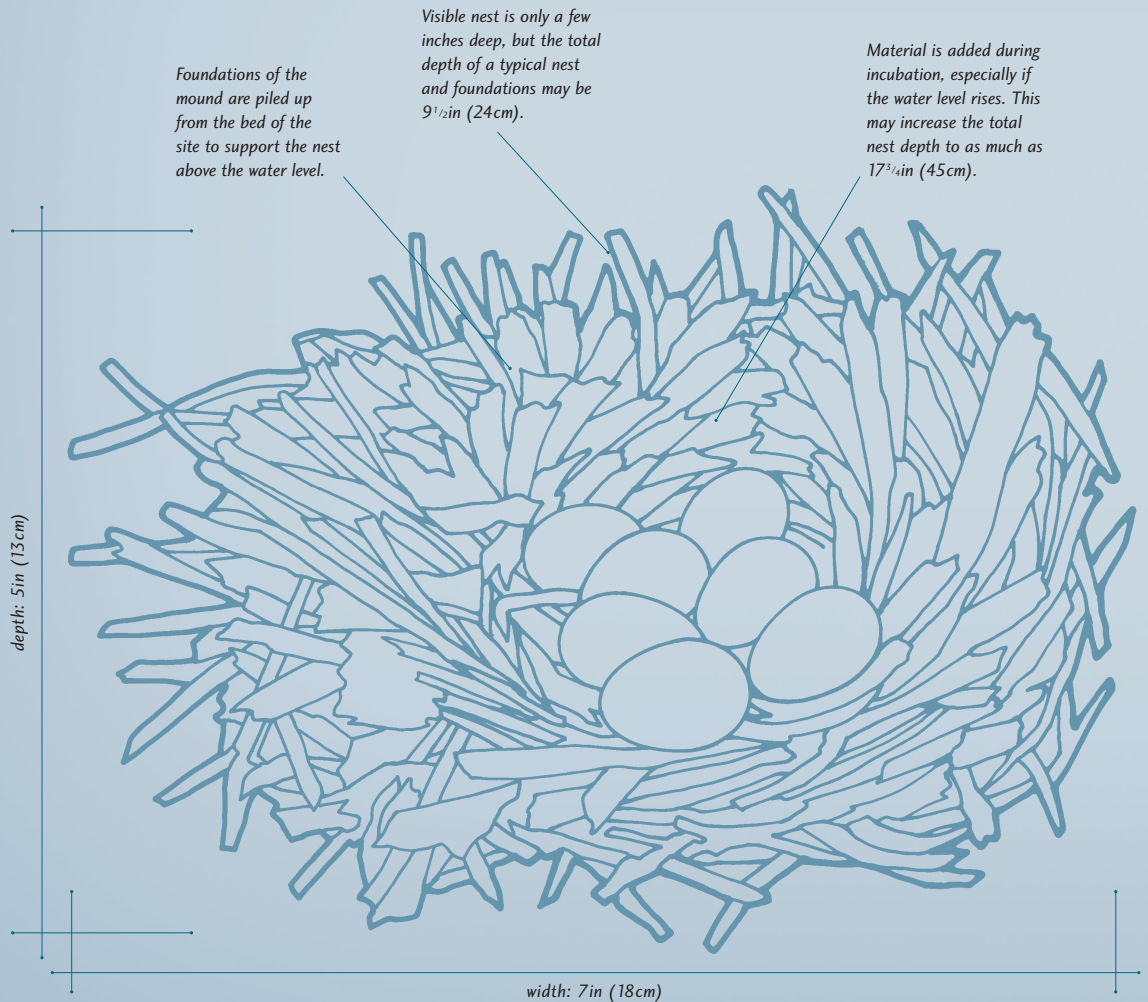


FIG. 1 EURASIAN COOT NEST

VARIETIES OF STRUCTURE

Substantial aquatic structures are built by the grebes, and the ornithologist K. E. L. Simmons, in his study of Great Crested Grebes (*Podiceps cristatus*) wrote that grebes are “efficient if not very elaborate nest builders.” The Rallidae, who also build substantially, have varied nesting habits. Some produce covered nests of grass, some nest away from water. For example, the Common Moorhen (*Gallinula*

chloropus) builds a platform of mostly dead water plants. It usually constructs its nest among aquatic vegetation, but will often build it in trees or bushes overhanging or near water, even as high as 20ft (6m) or more in a willow. Jacanas build flimsy, seemingly unsafe nests, as shown on page 58, and the parents have to be vociferous defenders of the nests and their young.

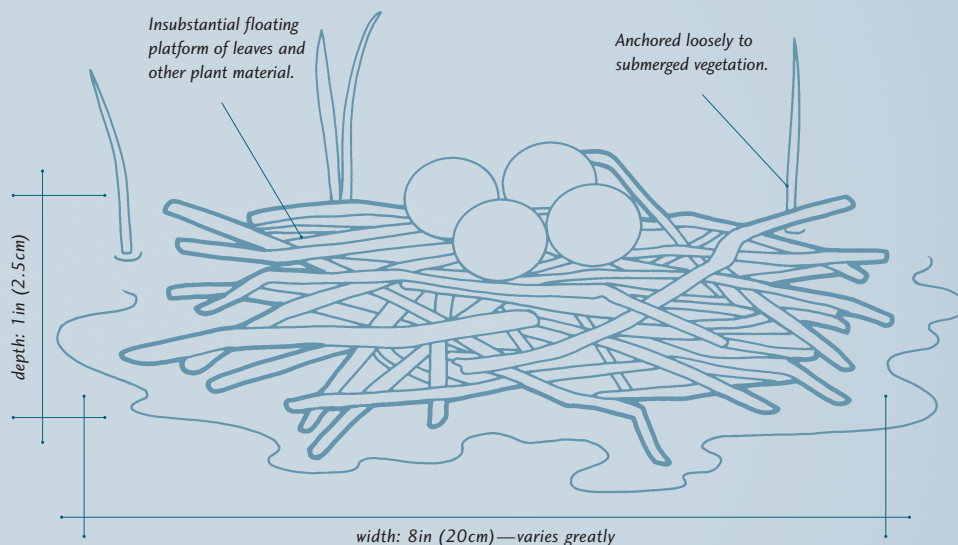


FIG. 2 FLOATING PLATFORM
The nest of the African Jacana (*Actophilornis africanus*) is typical of the eight species of jacanas. It is the male's responsibility to build the flimsy, floating platform of water lily leaves and water weeds, which sinks a little as he steps on it to incubate the eggs.

FIG. 3 ANCHORED FLOATING MOUND

Both Little Grebe (*Tachybaptus ruficollis*) parents pile up the floating heap of dead leaves in shallow water, close by the shore of

a lake or pond. The nest is anchored to a submerged bush. The white eggs soon become heavily stained by the iron deposits in the water, turning brown or even red.

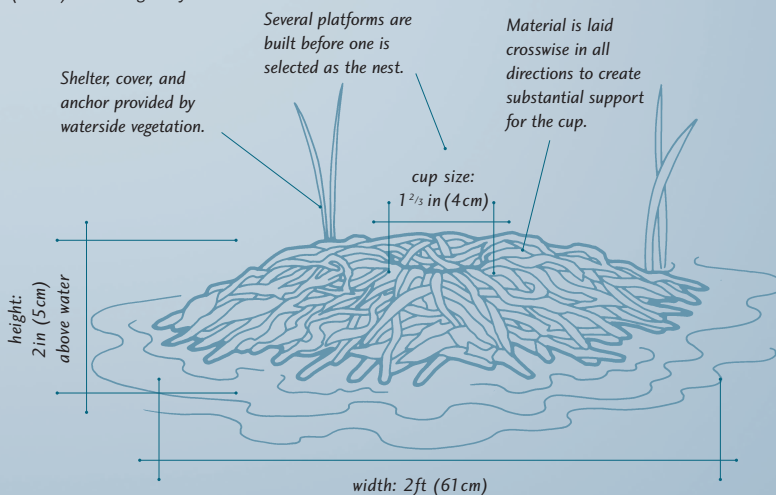


FIG. 2 AFRICAN JACANA NEST | FIG. 3 LITTLE GREBE NEST

MATERIALS AND FEATURES

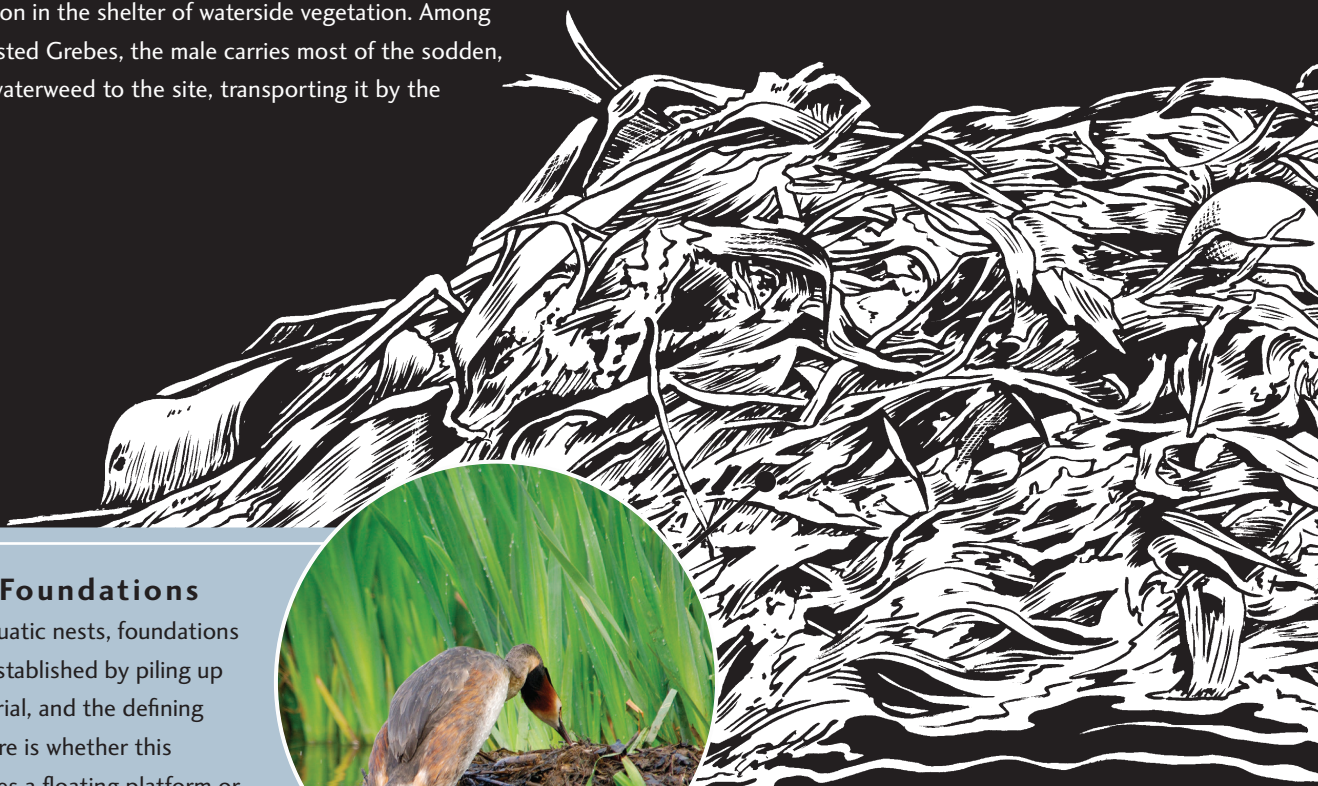
Great Crested Grebe Nest

The Great Crested Grebe (*Podiceps cristatus*) breeds widely on freshwater from the British Isles to China, in scattered populations in Africa, and in Australia. The pair builds one or more platforms by diving for weed and then piling it up until there is “land” expansive enough to support the weight of both birds. The grebe usually nests in a separate, carefully anchored construction in the shelter of waterside vegetation. Among Great Crested Grebes, the male carries most of the sodden, decayed waterweed to the site, transporting it by the

beakload. In shallower waters, the nest may reach to the bed, but otherwise it will be floating and anchored to surrounding vegetation. Most of the nest lies below the waterline—sometimes even the cup—making it an extremely damp home, which the chicks leave as soon as they have all hatched and are dry.

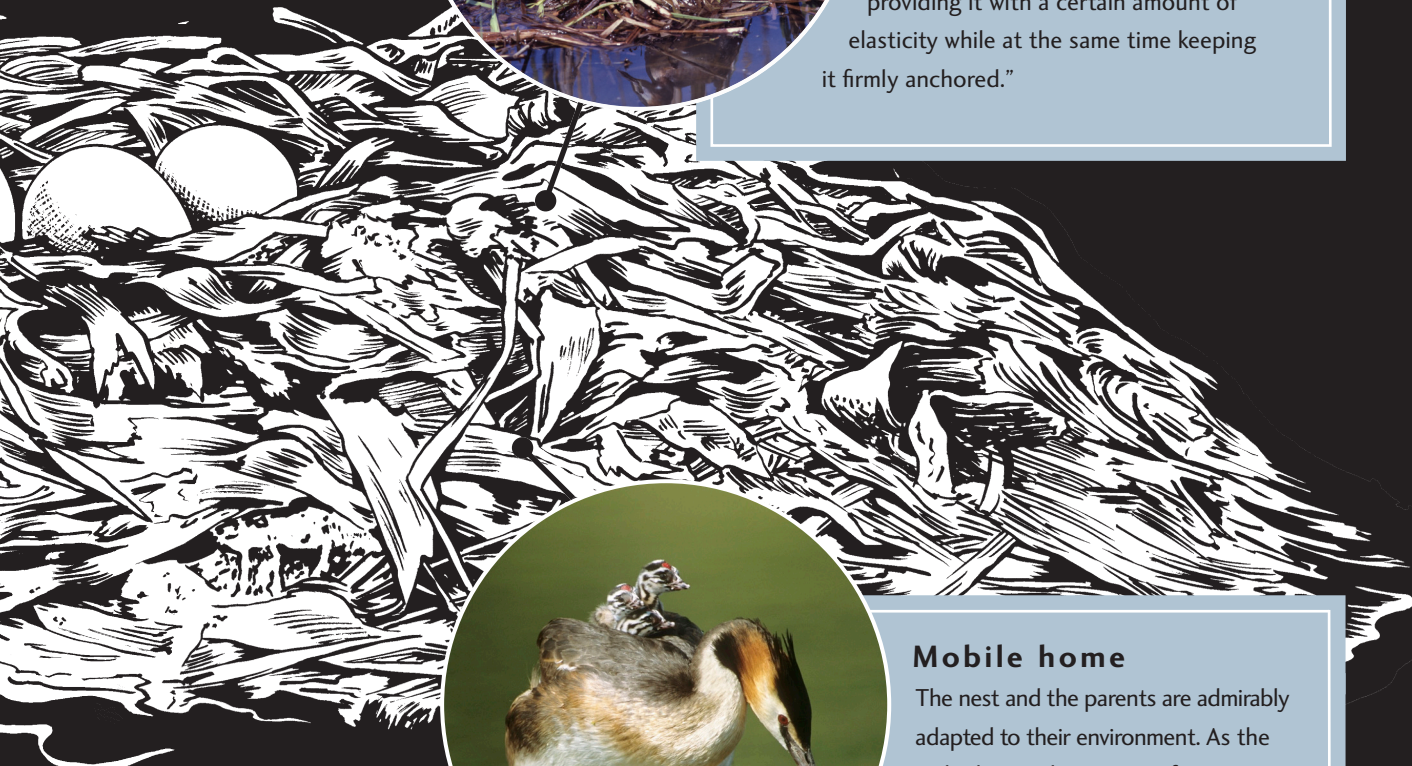
Foundations

In aquatic nests, foundations are established by piling up material, and the defining feature is whether this creates a floating platform or is sufficient in shallower waters to reach the bed. The Great Crested Grebe dives for its building material, waterweed, within 50yd (46m) of the nest site, and piles up profuse amounts. Observers recorded one pair transporting 100 beakfuls in less than an hour.



Elasticity

In severe weather the nest has to survive the motion of the water and the threat of flooding from the waves. This is where the elasticity of the building material and the capacity for an anchored floating nest to “ride” the waves like a boat provides advantage. Rankin (1947) observed of one Great Crested Grebe nest in bad weather: “One admired the skill of its builders in providing it with a certain amount of elasticity while at the same time keeping it firmly anchored.”



Mobile home

The nest and the parents are admirably adapted to their environment. As the grebe leaves the nest, it often covers the eggs by pulling weed and leaves over them. After hatching, the young are carried on the parents’ back for up to the first three weeks, providing a safe mobile home for fishing trips. Before the adult dives for food it shakes off the chicks.

CASE STUDY

Horned Grebe

Clumsy on land, the Horned Grebe constructs both floating and piled-up nests at the heart of its aquatic habitat. The bird winters as far south as Florida, the Mediterranean, and Japan. It nests across the northern temperate zone of North America and Eurasia, breeding on inland waters. The parents protect the young when they are very small, but the chicks are completely independent in about six weeks.



Nest and habitat

In the breeding season, the Horned Grebe prefers shallow lakes and ponds with fairly rich surrounding vegetation and a good food supply of small fish and other water creatures. Both sexes choose the nest site in new-growing sedge, horsetail, or willow, in water up to 3ft (90cm) deep. The site is usually among enough vegetation to reduce the water's wave action, but within a few feet of open water.

Nest building

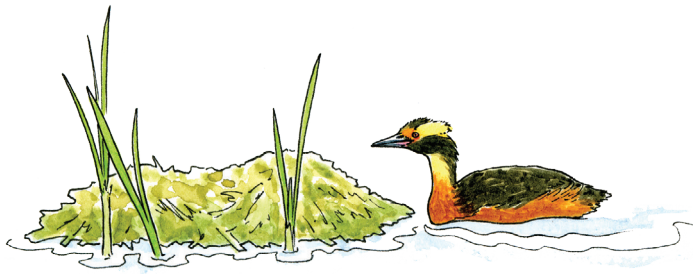
Courtship platforms are sometimes built before the nest. Although the pair chooses the nest site together, it is the male that usually starts building. The nest is built up from the bed of the pool or anchored to surface vegetation. Of 113 nests that were studied in Iceland, 97 were floating but anchored. Nest material is dived for and brought up in the bill. The pile may take only 3–4 hours to form; whatever the length of time, it is ready a few days before the first egg is laid. Both birds use their bills, feet, and bellies to engineer a cup for the 4–5 chalky white eggs.

Breeding and defense

The chicks are fed with aquatic food bill-to-bill. While they are small, they climb unaided onto a parent's back for safety. They can dive for safety when 10 days old, by which time they are no longer welcome onboard. A wing flap or a shake of the body by the adult sheds the young. During the weeks that the chicks are still dependent, they are defended vigorously by the parents with aggressive attacking behavior and a distraction display of clumsy diving with big splashes.

Classification

ORDER	Podicipediformes
FAMILY	Podicipedidae
SPECIES	<i>Podiceps auritus</i>
RELATED SPECIES	22 other grebes
NEST TYPE	Aquatic
SPECIES WITH SIMILAR NESTS	Coots, moorhens, marsh terns
NEST SPECIALIZATION	Anchored floating nest



1. The grebe swims at speed up to the unobstructed nest.



2. The bird uses its momentum to launch itself out of the water.



3. It propels itself the short distance to the cup.

**LEFT
ACCESSING
THE NEST**

All grebes have elongated bodies with their feet placed a long way back, making them very clumsy on land. The ideal nest, therefore, is one that the bird can swim right up to (1.). On reaching the nest, the bird has to launch itself out of the water (2.) before driving itself into the nest cup (3.).



**LEFT
MOBILE HOMES**

Grebes are unusual in that the young are carried on a parent's back from the chick's second day of life, unlike most other waterfowl, such as ducks and geese. All grebe chicks are characterized by their beautiful, striped downy plumage, especially on the head, hints of which remain until the juvenile feathered plumage is complete.

CASE STUDY

African Jacana

The insubstantial aquatic architecture of the African Jacana befits a bird that can move so easily over floating vegetation that it is known as the “lily trotter.” All the jacanas are tropical birds resident on freshwater ponds. The African Jacana is found widely across Africa from Senegal to Sudan, and south to South Africa. To survive such a fragile nest, the eggs are waterproof and the young are precocial.



Mating platforms

At the beginning of the breeding season just after the rains, the male defends a small territory and tosses together small piles of weed to construct floating “mating platforms.” A noticeably larger female courts him, and after mating she lays four eggs on one of the platforms. This floating platform then becomes the nest.

Female dominance

The female then deserts the nest, eggs, and the male, and mates with other males. She can produce up to 30 clutches of eggs each season, from either the same partner or various partners. The Wattled Jacana (*Jacana jacana*) of South America is known to have a harem of five males. It is believed female dominance has evolved to compensate for an extraordinarily high rate of egg loss. Biologist Stephen Emlen of Cornell University has described the female as “an egg-making machine.”

Defense and young

Male jacanas incubate the eggs and care for the young. The African Jacana has been seen to lift the eggs with his wings until they are under his brood patch and off the wet nest. When the male has to leave the nest, the eggs survive thanks to a waterproof cuticle. The precarious position of eggs and young on this nest is well shown here in this image from Chobe National Park, Botswana. The young chicks feed themselves as soon as they are dry. The male guards them and his alarm call will cause them to dive underwater. If danger persists, he will remove them elsewhere.

Classification

ORDER	Charadriiformes
FAMILY	Jacanidae
SPECIES	<i>Actophilornis africanus</i>
RELATED SPECIES	Seven other jacanas, other waders
NEST TYPE	Aquatic
SPECIES WITH SIMILAR NESTS	Other jacanas
NEST SPECIALIZATION	Floating nest, waterproof eggs

CASE STUDY

Black Tern

Black Terns are one of the three European “marsh terns.” The Canadian and American breeders winter in South America; the European birds are summer visitors that migrate to winter in central and southern Africa. They breed on fresh or brackish still water, 3–6ft (90–180cm) deep, and in swamps. The nest varies from a simple depression in vegetation to a substantial structure, and they also adopt Muskrat nests.



Nest and habitat

Black Terns nest in colonies of between 15 and 20 pairs, with nests 3–30ft (90cm–9m) apart. The nest is sometimes made from floating strands of vegetation anchored to one or two growing stems of a water plant, or built up on floating herbage. The eggs rest in a depression in the matted vegetation, and many nests are of strong construction. The pair pull material together to build a substantial mound, and the nest is lined with finer stems and seed heads. The eggs can withstand becoming wet, although not for long periods of time.

Adopted nests

Sometimes—and records suggest more so in North America than in Europe—a drier site is chosen on the top of an old grebe, coot, or Muskrat nest, or even on the ground. One American observer watched a female bring a beakful of weeds 14 times in half an hour to the top of the remains of an old Muskrat house. On this solid foundation, the nest is little more than a scrape lined with some strands of grass or sedge.

Defense and young

Black Terns are very vocal at the nest site. They aggressively attack intruders—humans, animals, or birds of prey—sometimes even striking the unwelcome visitor, to the accompaniment of intense screaming calls. The young are fed by both parents and are brooded in the nest for most of the first week, but they do wander into nearby vegetation when a few days old. They fledge when about three weeks old and become independent soon afterward.

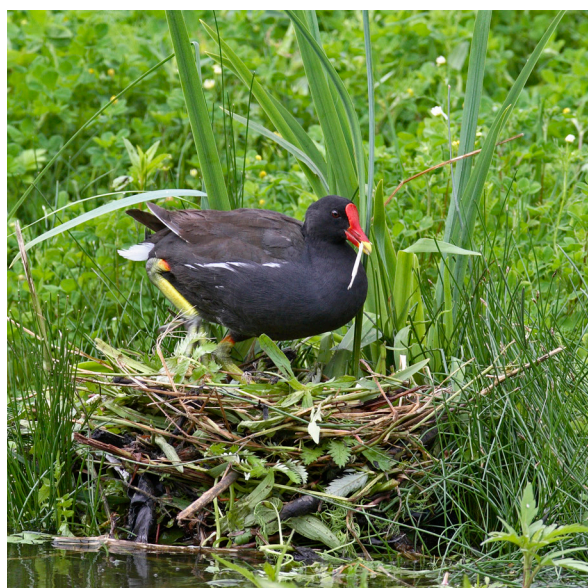
Classification

ORDER	Charadriiformes
FAMILY	Laridae
SPECIES	<i>Chlidonias niger</i>
RELATED SPECIES	Over 40 other terns
NEST TYPE	Floating platform
SPECIES WITH SIMILAR NESTS	Jacanas, grebes
NEST SPECIALIZATION	Adopted Muskrat house

CASE STUDY

Common Moorhen

The Common Moorhen builds quite a substantial nest on or near water. The species represents a classic and well-studied example of intraspecific brood parasitism, where a female lays eggs in the nests of other female Moorhens. It also has a form of cooperative breeding where the first brood sometimes tend young of later broods, brooding and feeding them, and assisting in nest repairs.



Its name

The name Common Moorhen is misleading today. The bird is not usually seen on the moors. “Moor” here is in the Old English sense of “marsh” because the bird is normally found around well-vegetated wetlands such as marshes, lakes, and canals. Its Old English name, Waterhen, is more suitable. That name was used of both male and female. The scientific name means “small chicken with yellow feet.” Its long toes enable it to walk easily in marshy habitat, and it swims well even though its toes are not webbed.

Distribution

The Common and American Moorhens (*Gallinula galeata*) really are common birds that are found across the world, except in the polar regions and tropical forests. In 2011 the birds in the Americas were declared to be a separate species, American Moorhen, which is found in North America and then south to the Caribbean, Brazil, and northwestern Argentina.

Breeding

Moorhens are territorial in the breeding season and will fight any strangers, including ducks, and drive them away. The nest is a pad of marsh vegetation and is usually well hidden in dense vegetation in the marsh or by the water; occasionally a pair will build a nest in low branches of a tree that is overhanging the water. Five to eight eggs are laid in spring and are incubated by both parents for about three weeks. The young fledge after 40–50 days but are looked after for several more weeks. The Common Moorhen is tolerant of human presence and is often found on lakes in city parks.

Classification

ORDER	Gruiformes
FAMILY	Rallidae
SPECIES	<i>Gallinula chloropus</i>
RELATED SPECIES	Coots, rails
NEST TYPE	Basket-shaped
SPECIES WITH SIMILAR NESTS	Coot, Water Rail
NEST SPECIALIZATION	The nest is sometimes reused by different females.



**LEFT
MOORHEN
FAMILY**

The chicks are tended by both parents in the nest, and when they have been led away to open water.



**LEFT
NEST AND EGGS**

The substantial nest is firmly fixed in the base of growing rushes.

CHAPTER FIVE

Cup-Shaped Nests



The cup-shaped nest provides the classic model of avian architecture, and the most widespread of all nest types. Protection for eggs and young is provided by a robust cup with insulated lining; strong support and anchoring notably with spider silk; and the site commonly being raised above ground level. In this relatively secure environment, newly hatched young are born helpless. The chicks are altricial (their parents need to nourish them) and nidicolous (they remain in the nest for a length of time after hatching).

Cup nest builders use a great variety of materials—roots, stems, twigs, leaves, lichen, flowers, and fruit. More exceptionally some birds, such as the American Robin (*Turdus migratorius*), add mud (see Chapter 7, pages 92–103, for the species that use only mud). Cup nests may show up to four elements in their construction: (1.) attachment, (2.) structure, (3.) lining, and (4.) decoration. The nest materials are bound through a combination of engineering techniques and the materials' natural shapes and textures—which help them to “interlock,” a term first used by Mike Hansell.

The power of flight facilitates the building of an intricate nest. Naturalist Walter Scheithauer described how he watched a Brown Inca (*Coeligena wilsoni*) hummingbird choose fine strands of hemp 4in (10cm) long, place them crosswise on a branch, and then pick up loose ends and fly clockwise around the branch until a small cushion was fashioned. Material was added and a cup formed through a sequence of skilled body, head, wing, and bill movements.

The size and shape of cup-shaped nests are directly related to the builder—this is normally the hen and she forms the shape of the cup by twisting, turning, and pressing her breast against the bottom and sides. Cup-shaped nests range in dimensions from the tiny hummingbird's half-walnut size to that of the Common Raven (*Corvus corax*), which averages 5½ft (1.7m) diameter and 28in (71 cm) depth.

The technically advanced architecture of a typical cup nest, such as that of the American Robin shown above, provides several key benefits. The cup is sturdy and well built, offering a good level of protection for eggs and chicks. It is securely attached to the tree, with birds such as the Common Chaffinch (*Fringilla coelebs*) constructing strong, fine anchors from spider silk. Excellent insulation keeps the temperature high during incubation—the Carrion Crow (*Corvus corone*), for example, constructs a luxurious lining of feathers, down, and wool. The cup form also helps to keep the growing chicks together. Less favorably, cup nests are not immune from predation and parasitism.

RIGHT
AMERICAN GOLDFINCH CUP
A female American Goldfinch (Spinus tristis) feeds her young, whose eyes are only recently opened.



BLUEPRINTS

Cup Nest Structures

Although the classic cup shape of this architecture is instantly recognizable, the great variety of materials used around the world ensures there is no one standard blueprint for the construction and composition of the outer nest layer, nor for the cup's lining. The four defining elements are the attachment, structure, lining, and decoration. Nests are built by several thousand species of passerines including jays, blackbirds, flycatchers, thrushes, crows, finches, warblers, and sparrows; cups are also built by many hummingbirds.

**FIG. 1
WATERSIDE
WOVEN CUP**
The female of the Red-winged Blackbird (*Agelaius phoeniceus*) pair builds the deep cup alone. It is secured tightly to uprights of sedges, rushes, cattails, or waterside trees. Construction materials include roots, grass, dead leaves, and mud, all firmly shaped, and then lined with fine, dry grass or similar material. The ideal site is the middle of a marsh, swamp, or water meadow. Territories are defended by the males, who gather a harem of several females—they choose such sites as the most promising in which to rear a brood, as has been well described by American naturalist Calvin Simonds.

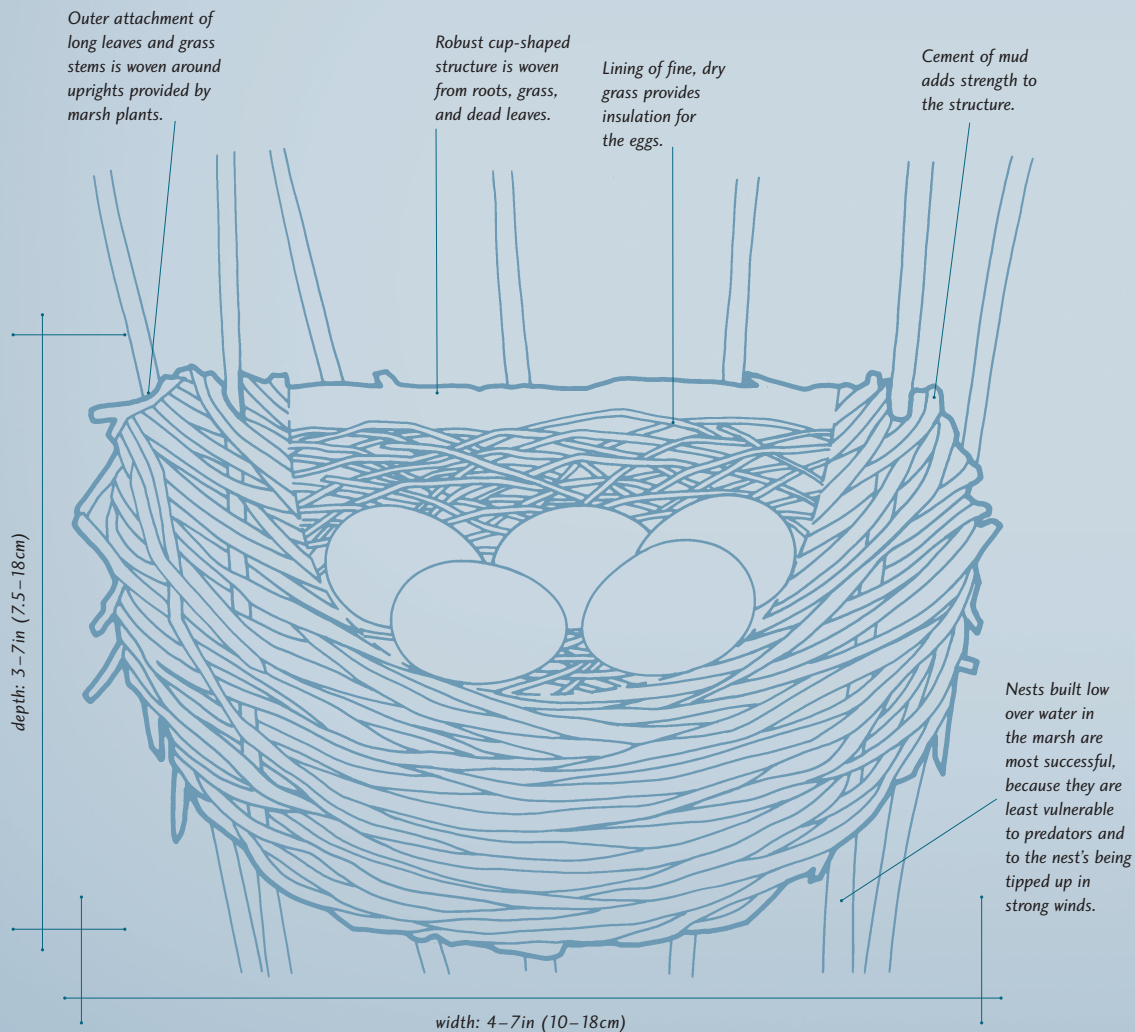


FIG. 1 RED-WINGED BLACKBIRD NEST

VARIETIES OF STRUCTURE

The size of the nest varies according to the bird—from a tiny hummingbird’s nest to that of a large crow. Nests are built in a variety of ways—for example, by weaving leaves and grass around plant stems; by using dry grass stems piled into a cup shape; or by binding plant material with spider silk. They are lined with soft material, such as fine grass or hair. Cup nests may be suspended from marsh plants or branches overhanging water or attached to trees or bushes on land.

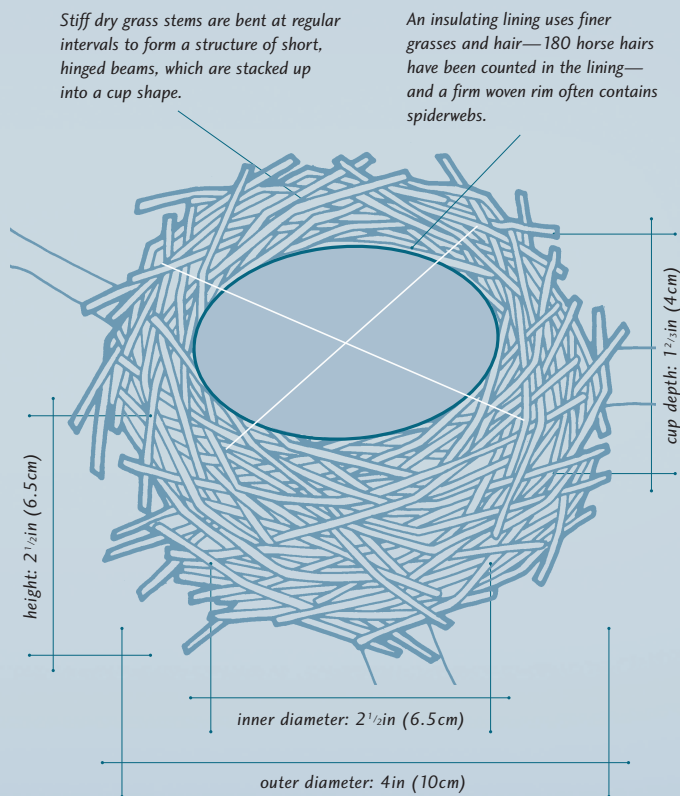


FIG. 2 CUP OF HINGED BEAMS
This neat hinged-beam structure is made of dry grass stems, mainly by the female Eurasian

Blackcap (*Sylvia atricapilla*). The male uses some grasses at the edge of the nest to bind the structure to the twigs of low bushes, honeysuckle,

or bramble. In spring, he makes up to seven simple nests or platforms, each taking 1–2 days to build. The bird employs song and

display to lure a female to his work. She chooses a “cock nest” and within 2–5 days completes the cup in which eggs will be laid.

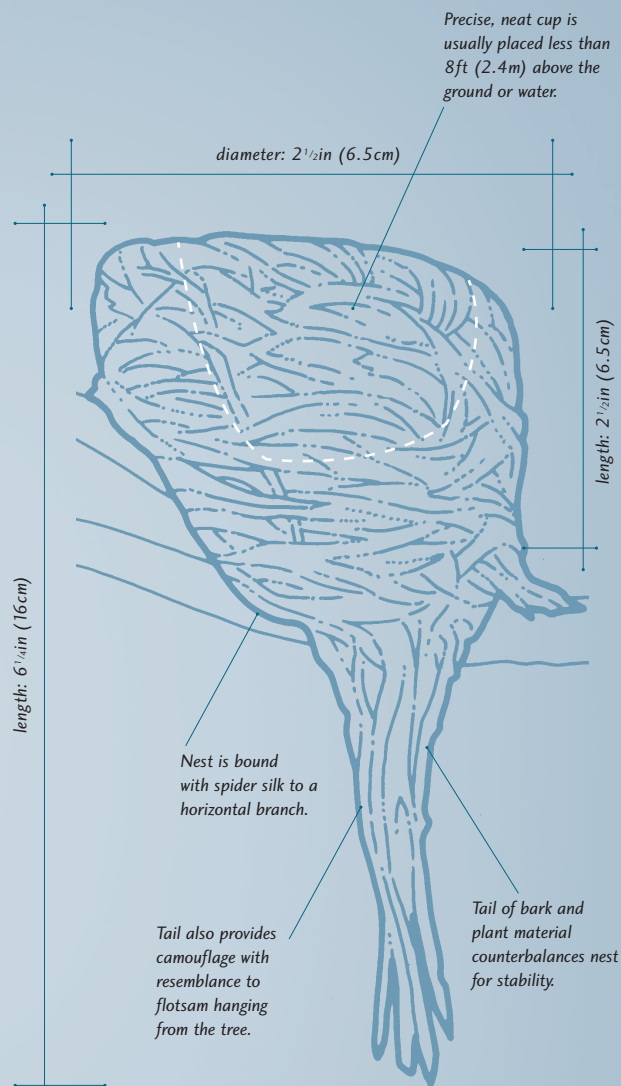


FIG. 3 WINE GLASS

In Australia, the Gray Fantail (*Rhipidura albiscapa*) binds its nest to a horizontal branch that often overhangs water. The beautiful goblet shape is made of soft grasses, finely shredded bark, and other plant material. The cup is an almost uniform buff color,

bound together and covered with spiderweb. The tail, or stem of the glass, may help disguise the nest to resemble flotsam caught in the tree, or may stabilize the cup perched on the branch. Such “tails” are features of other flycatcher and some hummingbird nests.

FIG. 2 EURASIAN BLACKCAP NEST | FIG. 3 GRAY FANTAIL NEST

MATERIALS AND FEATURES

Hummingbird Nest

Hummingbirds are tiny, compact birds that construct tiny, compact nests. A male Ruby-throated Hummingbird (*Archilochus colubris*) weighs $\frac{1}{100}$ oz (3g) and a female $\frac{11}{100}$ oz (3.3g). The nests of most take the form of simple cups, each smaller than a shot glass. Although some species suspend their nests, the typical hummingbird cup is attached directly on top of a tree branch. In most species, the female builds the nest, using small and light components that she binds together and adheres to the branch with spider or caterpillar silk taken from cocoons. Components such as bark, lichens, and leaf pieces are combined with the spider silk and molded into a cup nest. The interior is lined with softer material, such as plant fibers and animal hairs. Hummingbirds build among the most resilient nests of any bird. It can be argued that a nest that lasts so well has cost more effort than was needed. However, Ruby-throats and some other hummingbirds sometimes use an old nest as a base on which to build a new one the following season.

Insulating materials

Plant fibers, animal hair, and feathers are ideal materials to provide both a soft lining within the Ruby-throated Hummingbird's nest and insulation that ensures successful incubation of the eggs. The lining sits within a core structure built from bud scales and fluffy seed casings of thistle and dandelion, held in place with spider silk and occasionally pine resin, if available. The inward-curling lip of the nest is molded by the female. She pinches the combined materials between her bill, chin region, and chest, while rotating her body.



Camouflage

The Ruby-Throated Hummingbird is the only hummingbird likely to be seen in the eastern United States. The diminutive size of its nest in itself helps to keep it hidden, but camouflage is also vital. The outer wall of the nest is covered with gray lichen. As the photograph shows, this provides camouflage as it causes the nest to resemble the broken base of a branch or a decayed knot. The chick's dull colors, and later its juvenile plumage—which is similar to the green of the female—become part of the dappled light in the tree's canopy. This all helps to disguise the nest from predators.



Spider silk engineering

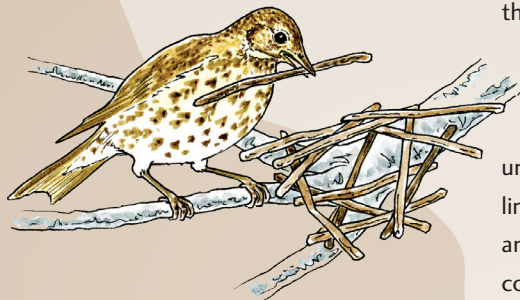
Guy ropes of spider silk are used to anchor the nest firmly to the branch it uses as a support. Spider silk is a protein fiber that has a relatively higher tensile strength than the steel cable typically used on suspension bridges, and is on a par with Kevlar fibers used to make bulletproof vests. Very light and able to stretch up to 40 percent of its length without breaking, it is an ideal natural substance for binding together an expandable nest.



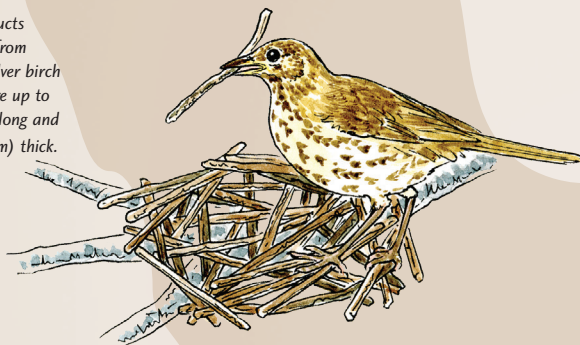
Cup-Forming Techniques

The Song Thrush (*Turdus philomelos*) is the most widespread thrush in Europe in woodland, parks, and gardens. As with other members of the thrush family (see page 74), it builds a cup nest of grass and moss on a twig base. The cup lining is strengthened with mud or rotten wood but, uniquely among its relatives, it does not then add a soft inner lining of fine grasses. Such a hard, dry lining is very unusual and its function is undetermined. There are many stages in the construction of this intricate nest.

1. The Song Thrush selects a site, usually a triple fork of laurel, on which to start building the platform attachment. The female works alone on the construction.



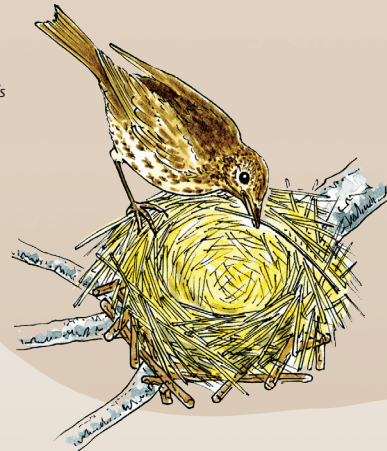
2. She constructs the platform from "beams" of silver birch twigs which are up to 12 in (30cm) long and 1/16 in (2–3mm) thick.



3. The thrush fills the base platform with moss, then shapes dried grass stems up to 7 1/4 in (18.5cm) and constructs them around and upward, to form the cup structure. Each stem is noticeably creased several times as it is bent and tucked in to form a circle.



4. Once the cup is completed, very fine grasses are twisted together to form the cup's firm, strong rim.



LEFT NEST SITE

This Song Thrush is feeding chicks in a nest that clearly shows its typical position—secured in a shrub's fork, and surrounded by thick cover.



(continued...)

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