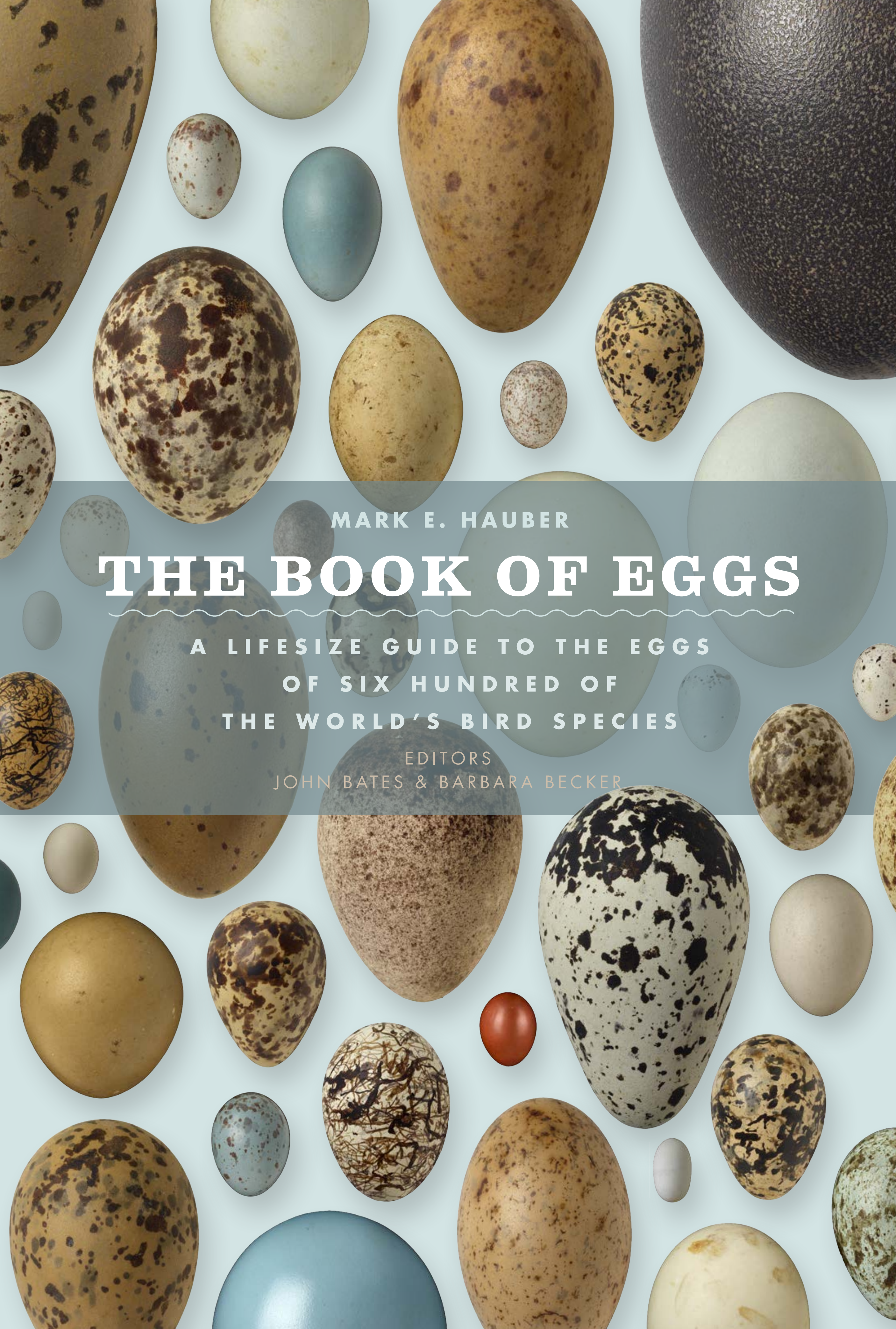

MARK E. HAUBER

THE BOOK OF EGGS

A LIFESIZE GUIDE TO THE EGGS OF SIX HUNDRED OF THE WORLD'S BIRD SPECIES

EDITORS
JOHN BATES & BARBARA BECKER

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MARK E. HAUBER

Edited by John Bates and Barbara Becker

From the brilliantly green and glossy eggs of the Elegant Crested Tinamou—said to be among the most beautiful in the world—to the small beige and speckled eggs of the House Sparrow that makes its nest in a lamppost and the uniformly brown or white chickens' eggs found by the dozen in any corner grocery, birds' eggs have inspired countless biologists and ornithologists, as well as artists, from John James Audubon to the contemporary photographer Rosamond Purcell. For scientists, these vibrant vessels are the source of an array of interesting topics, from the factors responsible for egg coloration to the curious practice of "brood parasitism," in which the eggs of cuckoos mimic those of other bird species in order to be cunningly concealed among the clutches of unsuspecting foster parents.

The Book of Eggs introduces readers to eggs from six hundred species—some endangered or extinct—from around the world and housed mostly at Chicago's Field Museum. Organized by habitat and taxonomy, the entries include newly commissioned photographs that reproduce each egg in full color and at actual size, as well as distribution maps and drawings and descriptions of the birds and their nests, where the eggs are kept warm and safe. Birds' eggs are some of the most colorful and variable natural products in the wild, and each entry is also accompanied by a brief description that includes evolutionary explanations for the wide variety of colors and patterns, from camouflage designed to protect against predation, to thermoregulatory adaptations, to adjustments for the circumstances of a particular habitat or season. Throughout the book are fascinating facts to pique the curiosity of binocular-toting birdwatchers and budding amateurs alike. Female mallards, for instance, invest more energy to produce larger eggs when faced with the genetic windfall of an attractive mate. Some seabirds, like the cliff-dwelling guillemot, have adapted to produce long, pointed eggs, whose uneven weight distribution prevents them from rolling off rocky ledges into the sea.

A visually stunning and scientifically engaging guide, *The Book of Eggs* offers readers a rare, up-close look at these remarkable forms of animal life.

Mark E. Hauber is professor in the Animal Behavior and Conservation Program at Hunter College, City University of New York.

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LEFT & BELOW **Tinamou eggs** are bright, shiny, and vulnerable; what makes these eggs produce a ceramic sheen remains a mystery for scientists.

INTRODUCTION

The mystery and beauty of the vast diversity of avian eggs easily captures the human imagination. One explanation for this may be that people and birds share each other's sensory worlds: we both communicate mainly through voices, colors, shapes, and other visible and audible displays to both our own kind and to other species. Bird songs remind us of the beauty in the world; watching bright and colorful birds at home and away both calms and alerts our senses; we read about and view with awe the long transoceanic flights of albatrosses, and the mating dances of cranes and birds-of-paradise. This book brings you the eggs of birds in a way that includes but also goes far beyond robin egg's blue, to capture the diversity that exists across the avian world.

PACKAGING LIFE

Avian eggs are a true biological masterpiece, and at the same time, a puzzle. Why is it that all birds, large and small, put their entire future (embryo, hormones, antibiotics, vitamins, and lipids) into a fragile package?

Humans and the majority of other mammals retain their fertilized eggs inside their bodies, where the developing young receive the nourishment and protection they need to grow directly from the mother. In contrast, a female bird packages everything that is needed to form a chick into its egg—and then ejects the egg from her body. Outside, the parent or parents must provide the warmth, shelter, and protection, typically in a nest, that the eggs need so that the embryos can fully develop and hatch into viable chicks. The stories of the eggs in this book highlight the vast array of strategies and choices birds make to find appropriate mates and nesting sites, to warm and protect the eggs, and to assure adequate food, water, and shelter for the chicks.

BELOW **The Emu's** eggshell is deep green and textured like an avocado; it takes nearly two months for this egg to hatch.

LEFT **Once the Maleo's** egg is laid, it is never touched again by the parents: it lies buried in warm sand until the chick hatches.

The diversity of birds that successfully reproduce via the egg is astonishing. Birds live on every continent and successfully breed in every terrestrial habitat. In the frigid Antarctic where winter temperatures are below minus 40 degrees and wind speeds may reach 200 miles (over 320 km) per hour, the male Emperor Penguin stands in place, carrying its single egg on top of its feet for two months to warm it before the chick hatches. In Chile, Gray Gulls breed in the world's driest deserts, where few predators can venture; the eggs and chicks are safe, but the parents must commute daily to the ocean to obtain food and water for themselves and their offspring.

We still have much to learn about the biology of birds' eggs, but there is no doubt that reproduction through eggs has been a very successful system for birds for millions of years. This book is a journey through the strategies that different bird species, and the tactics that different individuals, have evolved and adapted to successfully reproduce via the fragile egg.

RIGHT **A fossilized clutch** of dinosaur eggs (hadrosaur), found in China, was laid in the Jurassic era (some 150 million years ago), around the time when the first bird-like dinosaurs appeared.

WHICH CAME FIRST: THE CHICKEN OR THE EGG?

This age-old question is an easy one to answer: the egg. Why? An egg is simply a reproductive cell, and animals (including the dinosaurs, the direct ancestors of modern birds) were laying eggs for millions of years before the first chicken evolved. Of course, few non-avian eggs (then or now) looked like modern bird eggs: with a soft membrane and no hard casing in some cases, they are transparent, gelatinous, and quick to dry out. Most must remain in or near water in order for the young to develop and hatch.

Birds' eggs are "amniotic," meaning they contain features (including a hard shell and porous membranes) that allow them to be laid and develop on dry land. In the evolution of biodiversity on Earth, the appearance of the amniotic egg made possible a major shift: animals could leave water in order to reproduce. This trait helped amniotes—reptiles, dinosaurs, birds, and mammals—became a dominant form of animal life on Earth.

The story of when and how birds' eggs evolved also tells us something about birds' relationship with dinosaurs. The first amniotic eggs were laid by "basal amniotes," small lizard-like animals that appeared in the Carboniferous period about 325 million years ago. Relatively quickly, the basal amniotes diverged into two groups: the synapsids, which eventually evolved into mammals; and the sauropsids, which gave rise to the turtles, lizards, snakes, crocodilians, pterosaurs, dinosaurs, and birds.

UNDERSTANDING THE FOSSIL RECORD

Most scientists now accept that birds are a specialized subgroup of one branch of dinosaurs, the therapods. While dinosaurs flourished into many different niches of life throughout the Cretaceous, some therapods evolved features allowing them to fly. *Archaeopteryx*, dating to about 150 million years ago, combined reptile features (teeth, clawed fingers, and a long tail) with wings and flight feathers resembling modern birds'. While this well-known fossil is no longer considered to be a direct ancestor of modern birds, many other bird fossils show that the earliest forms were small, perhaps arboreal, and able to glide. Modern birds likely evolved from there.

By 100 million years ago, the two major groups of modern birds had split from each other. Based on differences in their skulls, the Paleognathes ("old jaws") include the flightless ostriches, rheas, cassowaries, emus, kiwis, and the extinct moas and elephantbirds, as well as the flighted tinamous; the Neognathes ("new jaws") include the rest of the birds we know today (see page 649). By the end of the Eocene, about 34 million years ago, all of the modern bird orders (and many of the families) roamed and flew the Earth as members of distinct and recognizable lineages.

We do not know what color dinosaur eggs were, although from fossilized remains, scientists have established that the surface was rarely smooth, but instead was textured with holes and bumps—much like eggs of modern cassowaries and emus. Recent research has begun to reconstruct the structure, chemical make-up, and color of fossil feathers; in future the

BELOW **Modern crocodiles** and alligators are the closest living relatives of birds. New fossils and modern research techniques offer fresh insights into whether the first bird eggs were smooth and white—like these reptiles'—or diversely shaped and colored, as are many bird eggs today.

same could be done for eggshells. Perhaps the evolutionary history of egg coloration was overlooked because many modern species lay smooth and white eggs. But we must not forget the huge variety of egg colors and surface texture among Paleognathes such as emus (dark green), rheas (light blue), and tinamous (polished blues, browns, and greens); even the extinct moas had at least one species, the Upland Moa, which laid a dark blue-green egg.

Egg color is mostly produced by pigments laid down on an initially white egg while it is still in the female's body. Since pigmentation appears to be a secondary step in the formation of hard-shelled eggs, some scientists have argued that the first bird eggs would have been white, as crocodile eggs are today, and only later did pigmentation appear among birds. But this line of thought assumes that the eggs of the dinosaurs were also white, which is unproven. In addition, many seabirds, including penguins and gannets, have a distinct blue hue to the eggshell matrix between the inner and outer edge of the shells; this suggests that eggs may also be pigmented while the calcite (calcium carbonate) crystals are formed to generate the hard eggshell during the 24 hours prior to laying.

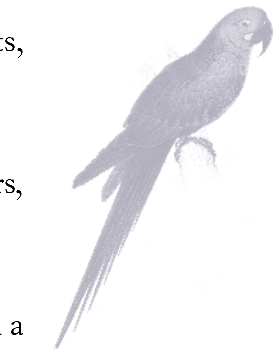
While any one female bird typically lays consistently colored and patterned eggs, when resources are limited, the same female may lay not only smaller but also paler, less pigmented eggs. The implication is that we can only speculate about the color and pattern of the eggs of the first birds, and also of the egg laid by a bird in the hand just yesterday.

HOW THIS BOOK IS ARRANGED

The species whose eggs are represented in this book are organized into four chapters, representing a reasonable although not entirely phylogenetic presentation. Within the sections, the arrangement is taxonomic, by order and then by family. The four chapters are:

Water Birds including ducks, geese, loons, herons, gulls, shorebirds, and relatives

Large Non-passerine Land Birds including ostriches, emus, tinamous, chickens and other fowl, and birds of prey



Small Non-passerine Land Birds including doves, cuckoos, swifts, hummingbirds, woodpeckers, and parrots

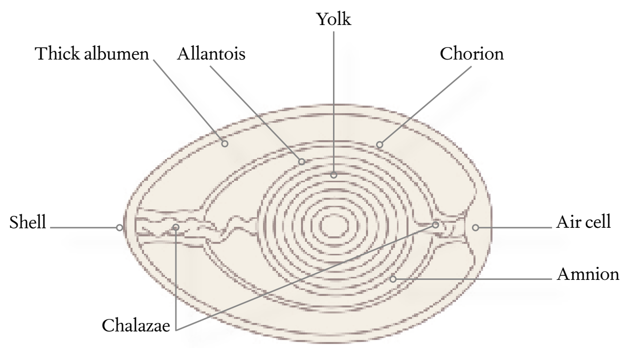
Passerines "perching birds," including New and Old World flycatchers, jays, swallows and swifts, warblers, sparrows, blackbirds, and finches.

The classifications of birds are always in a state of flux as we gain a better understanding of the avian tree of life through both genomic and paleontological research. For those with an interest, a tree of modern relationships is presented on pages 648–9.

Each of the 600 featured birds is shown with a life-size color photograph of its egg. Additional photographs provide close-up details of shell texture and patterning and a view of the typical clutch size (when more than one egg). The actual sizes depicted are based on the specimen (with average dimensions cited in the caption, where the egg's typical appearance is also described). In some cases, eggs become discolored during incubation; others fade over time (many of these museum specimens are over a century old). As a result, the description may not match the image precisely. In a few cases where eggs are rare or unknown, there continues to be disagreement in the literature as to what is "typical" of a species; these cases are pointed out. The text for each entry explores the egg in relation to the breeding strategy of that species, although for some very little is known about their eggs, nests, or breeding behaviors; much research remains to be done.

Accompanying the text and color photographs is a map showing the breeding range of each bird, a summary of its breeding habitat, nest type and placement, and its current conservation status. Small engravings of the bird offer a quick visual aid; the range of measurements is provided for an appreciation of the average adult size. The collection catalog numbers from the Field Museum (FMNH), or the Western Foundation for Vertebrate Zoology (WFVZ) can be used to find out via the museums' online egg databases when and where these eggs were collected. See Resources & Useful Information, page 647, for the web site addresses.

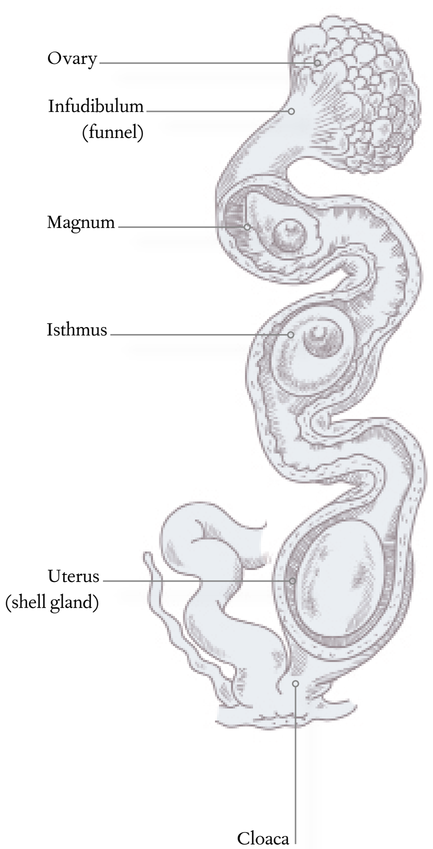
ABOVE **The engravings** on these pages represent the four chapters into which the 600 species of birds in this book are organized—the water birds and the land or terrestrial large and small birds.



RIGHT **The freshly laid egg** contains many compartments, separated by the different layers of the calcified eggshell and a series of internal membranes.

EGG ANATOMY & PHYSIOLOGY

BELOW **Egg formation** requires a full day; in most birds only the left ovary is functional, limiting the rate of egg laying to one per day.



The avian egg is the equivalent of a furnished apartment at a vacation resort: it contains all the ingredients and structures required for safely housing the developing embryo, but it needs regular parental servicing and support to function fully. The internal architecture of the egg includes both the genetic machinery and the biochemical structures required to build a viable hatchling.

The already fertilized embryo is enclosed in the amnion, nourished by the yolk and the allantois. The yolk contains high amounts of fat, cholesterol, protein, vitamins, and minerals needed by the developing embryo, while the allantois aids respiration by storing nitrogeneous waste.

These compartments are enclosed within the chorion, and surrounded by the albumen (commonly known as the "egg white"), which supplies hydration for the embryo, and acts as a shock-absorber against sudden movements by the egg. Twisted threads called chalazae (the textured strings sometimes seen in raw or soft-cooked eggs) attach the compartment to the shell for added stability.

Membranes on the inner and outer surface of the shell act as physical and biological barriers to desiccation and bacterial infestation. In addition, both the albumen and the eggshell cuticle contain enzymes and other proteins that have active antimicrobial properties. These enzymes are activated by heat, and so sitting on the eggs at night, even before full incubation begins, may serve to protect the eggs from infections. The whole of this package is contained in the hardened eggshell, which is made up mostly of calcium carbonate. However, this eggshell is semi-permeable, with microscopic pores that penetrate the shell, providing channels for gas exchange necessary for respiration by the developing embryo.

ABOVE **Common Tern** hatchling with sibling breaking out of its shell; females lay only one egg a day so different eggs in the same nest may hatch at different times.

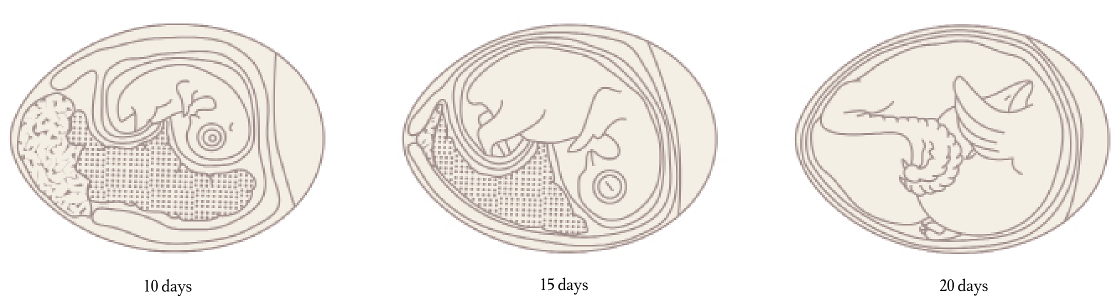
Because of the hard shell, the egg must be fertilized while it is still inside the female's body, before the shell has formed. The chicken's ability to lay eggs whether they are fertilized or not accounts in part for its eggs being such a food staple for humans.

While the egg itself provides much that the embryo needs, the parents must still provide critical services. Typically, one or both parents provide the external heat necessary to jump-start embryonic metabolism, and maintain the necessary microclimate, including high levels of humidity, to keep the eggs from desiccating. They select nest sites and build or usurp nests for the eggs to shield them from predators, sun, dryness, and other threats. They also rotate the eggs in the nest to assure even heating or cooling, and to prevent embryonic malformation.

EGGS & ENVIRONMENTAL TOXINS

The avian egg is a compact and adaptable product of evolutionary engineering. Yet human activities are capable of compromising and even breaking down this highly functional reproductive system. Toxic chemicals such as DDT, introduced into the environment during the 1960s, interfered with some birds' ability to produce the calcium needed to harden the eggshells. The result was thin-shelled eggs unable to bear the weight of the incubating adults; the eggs were crushed, ending in reproductive failure. It took 30 years for populations of Peregrine Falcons, Osprey, and Brown Pelicans to recover their numbers after the banning of DDT.

BELOW **Embryonic development** of the chicken is rapid; most organs are formed by day 10, and grow and mature to hatch less than a week later.



Costa's Hummingbird

Long-tailed Sylph

Pied Kingfisher

Great Elephantbird

EGG SIZE & SHAPE

ABOVE **The term "ovoid," or "egg-shaped,"** applies to all bird eggs; different species—and different eggs of the same species—may be spherical, oval, elliptical, or conical.

Bird eggs come in extreme sizes and shapes. The ostrich's egg is the largest and heaviest of any living bird; weighing in at over 4 lb (2 kg), it represents over 30 chicken-egg equivalents. At the other end of the scale, the smallest eggs are laid by hummingbirds; they are 1/5,000th the size of an ostrich egg and may weigh less than a paper clip. Some species of the extinct elephantbirds laid eggs that were well over twice the size of an ostrich egg.

SIZE MATTERS

In general, larger birds lay larger eggs; they also have thicker shells, which makes mechanical sense, with each egg having to withstand some of the weight of the incubating adult sitting on top of it. But when considered in relation to adult body weight, egg sizes tell a different story. In this context, ostrich eggs are rather small for the adult's weight and hummingbird eggs are rather large. Some of largest eggs of any bird relative to the female's body weight are laid by the several kiwi species of New Zealand.

Thus, relative egg size, compared to adult body weight, is far from constant and varies extensively with ecology and evolutionary history. For example, birds that lay larger clutches also tend to lay smaller eggs, and species whose chicks hatch fully feathered and ready to follow the parents, tend to produce larger eggs than species whose chicks hatch blind and naked and require prolonged parental care. An egg's size often varies with its internal content, including lipids in the yolk, and the concentrations of hormones, vitamins, and maternal antibodies in the yolk and the albumin. Eggs with smaller yolks typically hatch earlier, with the young soon having to obtain additional nutrition for growth on their own, or by begging for provisions actively from the parents.

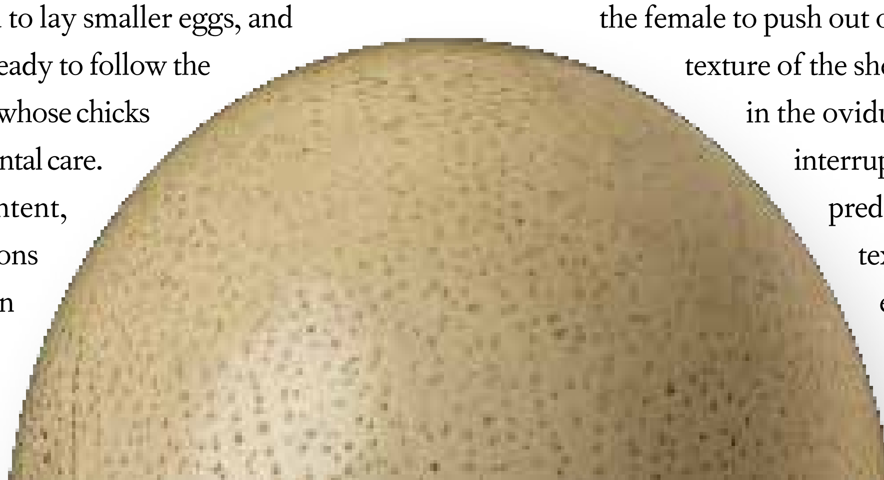
THE ADVANTAGES OF BEING "EGG-SHAPED"

Most eggs have a clearly identifiable blunt end (or pole), typically formed where the shell is physically closer to the cloaca in the oviduct; the sharp end forms nearer the ovary. The shell is typically thinner near the blunt pole and thicker near the equator and sharp pole. But as the embryo grows, the calcium from these thicker shell regions is recruited as building material for the developing bones in the skeleton, so that at the time of hatching, most regions of the shell are equally thin. Chicken embryos typically face the blunt pole with their beaks, and start breaking the shell in this region in preparation for hatching.

"Egg-shaped," or ovoid, has many advantages: despite the fragile shell, an ovoid can withstand surprising compression (for example, from the incubating adult's weight) before it breaks. An ovoid is also easier for the female to push out of her body. The symmetrical shape and smooth texture of the shell is achieved by muscles rotating the entire egg in the oviduct during shell formation; when this process is interrupted, for example due to trauma or aggression by predators or competitors, an asymmetrical and rough-textured egg may be formed, causing difficulties, or even death, to the female during laying.

BELOW **The eggs of some seabirds** that nest on steep cliffs and ledges are often conical; if bumped, they roll in a small circle and so avoid falling off.

Common Murre



Ostrich

RIGHT **Shorebirds, such as the Killdeer**, nest on open ground, and lay heavily pigmented and camouflaged eggs to reduce the likelihood of predators spotting their clutch.

EGG COLORATION & PATTERNING

The photographs in this book reveal the astonishing colors and patterns of avian eggs. Eggs are made primarily of calcium carbonate, which is white to the human eye. While many bird eggs are also white, all the additional variation in eggshells is the result of the interaction of physical and chemical properties of the shell and just two major pigments: biliverdins, which are responsible for the blue-green hues of eggs, and protoporphyrins, which make the rusty colors, from yellow to red to brown. Spotted, lined, blotched, or scrawled eggs have higher concentrations of protoporphyrins. When the two pigments combine in different proportions they can create hues from violet to green.

PIGMENT POWER

How is it possible that just two pigments, interacting with the crystalline structure of the eggshell, can generate the diversity of shell coloration and patterning seen in nature? The surprising answer is that we simply do not know yet. All the studies that have attempted to extract pigment-like compounds from avian eggshells have produced chemicals consistent with the structure of biliverdin and protoporphyrin, or chemicals whose structure could not be identified even with the latest analytical instruments. Biologists and chemists now must combine forces to solve this conundrum. Despite this outstanding question, some reasons for egg colors are relatively straightforward to explain: for example, the typically whitish eggs of the Horned Grebe quickly become stained red from the wet plant matter used to cover the eggs when the incubating parent is off the nest.

The shell gland compartment of the oviduct has to take resources away from the laying female and divert them into producing colorful pigment molecules, which then combine to generate the background color and the spotting, streaking, and blotching on the eggshell. Scientists therefore argue that white eggs are "cheaper" than colorful ones and more likely to be produced by birds whose eggs are hidden in a deep nest (or nest hole) or under the cryptic plumage of a dedicated incubating parent. This is the case for the white eggs of woodpeckers, hummingbirds, ducks, and owls. Sometimes, patterning on eggs can be critical to identifying individual eggs laid in a colony, such as the fantastic variation among individual eggs of Common Murres. In this species, variation has evolved to allow parents to pick out their own egg from a thousand on a crowded cliff face.

A critical piece in the conversation about egg colors is that we have only recently begun to learn about what the birds themselves see. All birds have four photo receptor proteins, compared to three in humans, which provides them with instantly more accurate and detailed color perception, relative to humans, including seeing color in the ultraviolet (UV) region, not visible to people. Researchers are now surveying and analyzing eggshells with physical instruments, such as UV-filter camera-lenses and reflectance spectrometers to reveal unexpected variation between and within eggshells, that birds can see, but, until recently, scientists had not.

BELOW **Egg appearance** is generated by pigments deposited within and atop the eggshell (as in the left and central columns), but also by powdery materials which wear off during incubation (shown here in the right column).

Wren-like Rushbird

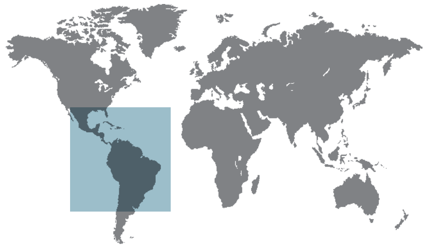
Great Bowerbird

Smooth-billed Ani

White-bellied Nothura

Vermillion Flycatcher

Guira Cuckoo

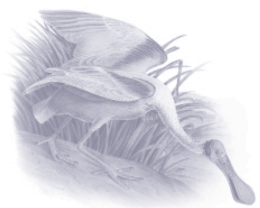


ORDER	Ciconiiformes
FAMILY	Threskiornithidae
BREEDING RANGE	Gulf of Mexico coastline, the West Indies, Central and South America
BREEDING HABITAT	Inland marshes, bays, and estuaries with stands of brushes and trees
NEST TYPE AND PLACEMENT	Platform nest of sticks, built in shrubs or trees, including mangroves
CONSERVATION STATUS	Least concern
COLLECTION NO.	FMNH 21161

ADULT BIRD SIZE
28–34 in (71–86 cm)

INCUBATION
22–24 days

CLUTCH SIZE
2–5 eggs



PLATALEA AJAJA

ROSEATE SPOONBILL

CICONIIFORMES

Clutch

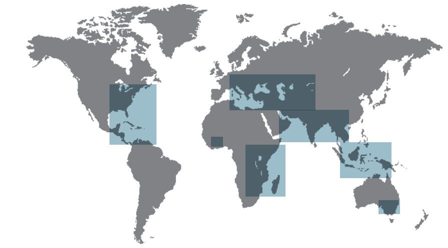
Female and male Roseate Spoonbills are similar in size and coloration, leaving behavioral cues as the means of telling the sexes apart. The male attracts the female to a suitable nesting site by offering a piece of twig. Once chosen, the newly formed pair complete their nest together, take turns to incubate the eggs, and both members provision the chicks. Though they nest in loose colonies, often with other wading birds, these spoonbills are typically silent and solitary feeders during the breeding season.

The pink coloration of this spoonbill species is derived from consuming shrimp and other crustaceans, which in turn feed on carotenoid- (red pigment-) producing algae. The bright plumes, however, cost the birds dearly in past centuries; many spoonbills were shot to collect feathers as adornments for human fashion trends. Today, coastal habitat losses, and the fast-paced development of beachside communities, present the gravest conservation concern for this species.

Actual size

The egg of the Roseate Spoonbill is whitish in background, with brown markings of speckles and blotches, and measures 2 ½ x 1¾ in (65 x 44 mm) in size. The eggs are vulnerable to predation by raccoons and the chicks by invasive fire ants.

ORDER	Ciconiiformes
FAMILY	Threskiornithidae
BREEDING RANGE	Eastern North America, coastal Caribbean, Europe, Southeast Asia, Africa, Pacific islands, Australia
BREEDING HABITAT	Marshes and wetlands
NEST TYPE AND PLACEMENT	Shallow stick and twig nest, lined with grasses, in low bushes and trees
CONSERVATION STATUS	Least concern
COLLECTION NO.	FMNH 5320



PLEGADIS FALCINELLUS

GLOSSY IBIS

CICONIIFORMES

ADULT BIRD SIZE
19–26 in (48–66 cm)

INCUBATION
20–23 days

CLUTCH SIZE
3–4 eggs

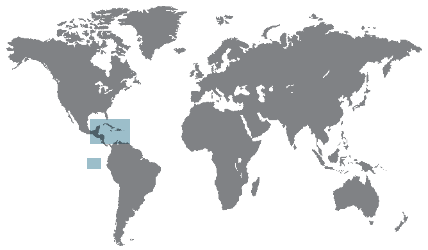
This is the world's most widely distributed ibis species, occurring on all continents in both hemispheres. They nest in colonies with ibis of the same and different species, as well as herons and egrets. However, around the nest's vicinity, these ibis are highly aggressive and territorial. Both sexes incubate the eggs and feed the nestlings, changing guard over the eggs and small chicks following prolonged vocal displays to one another.

Incubation is asynchronous, which means that by the time the last laid egg hatches, the new chick is typically younger and smaller than its nest mates. Parents feed the chicks by regurgitating recently captured food and putting it directly into the beaks of the chicks. However, unlike the case in many heron nests, this ibis' young do not directly fight with each other, perhaps because the parents appear to preferentially feed the smallest chick in the nest first. Thus, parental control over their progeny, it appears, is complete in the Glossy Ibis.

Clutch

The egg of the Glossy Ibis is pale blue or green, immaculate, and elliptical in shape, measuring 2 x 1½ in (52 x 37 mm) in size. The hatchlings grow rapidly and leave the nest after just one week, but do not become flighted until three weeks later. They leave the nesting colony with their parents at two months of age.

Actual size



ORDER	Pheonicopteriformes
FAMILY	Phoenicopteridae
BREEDING RANGE	Islands and continental shores of the Caribbean, Galapagos
BREEDING HABITAT	Mudflats, lagoons, coastal lakes
NEST TYPE AND PLACEMENT	Ground nest a crater of built-up mud, standing in shallow water
CONSERVATION STATUS	Least concern
COLLECTION NO.	FMNH 2170

ADULT BIRD SIZE
47–57 in (120–145 cm)

INCUBATION
28–32 days

CLUTCH SIZE
1 egg

PHOENICOPTERUS RUBER

AMERICAN FLAMINGO

PHEONICOPTERIFORMES

The only flamingo native to North America, this charismatic and conspicuous species relies on the safety of large flocks and hard-to-access breeding sites, rather than weaponry or aggression, to defend its nest. Crowded colonial life is so essential for the American Flamingo that, in captivity, zookeepers have been able to induce small groups of captive flamingos to nest and breed successfully by playing back sounds of large numbers of birds recorded at large colonies.

The success of the American Flamingo's strategy of feeding and breeding on remote mudflats and lagoons has allowed them to maintain population sizes despite laying just a single egg per year. Some individuals can survive to more than 40 years of age, assuring that at least a handful of those breeding attempts will yield a viable chick to recruit for the next generation.

The egg of the American Flamingo is chalky white in color, immaculate, elongated in shape, and 3⅓ x 2 in (85 x 53 mm) in size. Occasionally, two eggs are laid in the same nest, apparently by the same female, and both parents take on the duties of incubation and provisioning the young.

Actual size

ORDER	Anseriformes
FAMILY	Anhimidae
BREEDING RANGE	Tropical northern South America
BREEDING HABITAT	Marshes and swamps with dense vegetation
NEST TYPE AND PLACEMENT	A floating platform of swamp plants
CONSERVATION STATUS	Least concern
COLLECTION NO.	FMNH 2866

ADULT BIRD SIZE
33–37 in (84–95 cm)

INCUBATION
42–47 days

CLUTCH SIZE
2–7 eggs

ANHIMA CORNUTA

HORNED SCREAMER

ANSERIFORMES

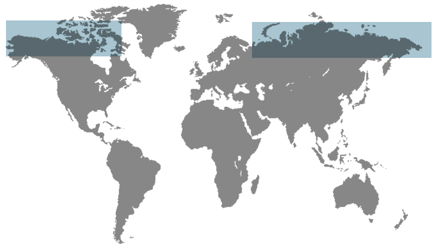
Screamers are related to ducks and geese, but their heads and beaks, as well as their habits, are chickenlike. Adult Horned Screamers are ornamented with a pair of spurs on their legs and a long, thin, spiny horn on the top of the head that grows continually throughout life.

Unlike ducks and geese, screamers have partially webbed feet and feel as comfortable on water as in grassland and perching on tree branches. Both the male and female construct the nest, with the female incubating the eggs during the daytime, and the male typically warming the eggs at night. The hatchlings, like those of the related geese and ducks, leave the nest on their own feet within a day of hatching.

Clutch

The egg of the Horned Screamer is cinnamon-brown in color, without speckles, and roundish in shape. It measures 3⅓ x 2⅜ in (85 x 61 mm) in size. The eggs are laid in a nest that is reused in subsequent breeding seasons, typically by the same pair of adults.

Actual size



ORDER	Charadriiformes
FAMILY	Charadriidae
BREEDING RANGE	Arctic regions of North America, Europe, and Asia
BREEDING HABITAT	Open grasslands, dry heath tundra
NEST TYPE AND PLACEMENT	Shallow scrape in gravel, lined with lichens, twigs, and pebbles
CONSERVATION STATUS	Least concern
COLLECTION NO.	FMNH 15062

ADULT BIRD SIZE
10½–12 in (27–30 cm)

INCUBATION
26–27 days

CLUTCH SIZE
4 eggs

PLUVIALIS SQUATAROLA

BLACK-BELLIED PLOVER

CHARADRIIFORMES

Clutch

The Black-bellied Plover, known as the Grey Plover in Europe, is one of the most widely dispersed shorebird species in the world. This is because it migrates long distances across continents and over open water from its Arctic breeding grounds to coastal wintering areas in temperate regions of the northern hemisphere, but also in coastal regions of South America, Africa, and Australasia. Because young of this species do not begin breeding until two years of age, these plovers can be seen throughout the year at any region of their worldwide distribution, which accounts for their cosmopolitan occurrence and familiarity to birdwatchers.

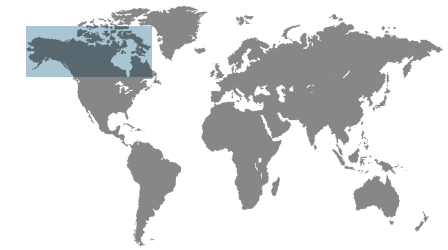
Black-bellied Plovers serve an important role as sentinels for foraging shorebirds, detecting approaching predators. They are the first to call the alarm and take flight, alerting the other species in the flock. Incubating adults are also quick to flush from the nest when predators approach, but once the danger is over, they reliably return, and do not abandon the clutch of eggs.

Actual size

The egg of the Black-bellied Plover is pinkish to brownish, with dark spotting heaviest around the blunt end. It measures 2⅛ x 1½ in (53 x 37 mm) in size. Both parents attend the nest and the chicks, before they become independent at five to six weeks of age.

WATER BIRDS

ORDER	Charadriiformes
FAMILY	Charadriidae
BREEDING RANGE	Canadian and Alaskan Arctic
BREEDING HABITAT	Open, rocky and grassy hillside slopes in the tundra
NEST TYPE AND PLACEMENT	Scrape in the ground, lined with lichens, grass, and leaves
CONSERVATION STATUS	Least concern
COLLECTION NO.	FMNH 16021



ADULT BIRD SIZE
9 ½–11 in (24–28 cm)

INCUBATION
26–27 days

CLUTCH SIZE
4 eggs

PLUVIALIS DOMINICA

AMERICAN GOLDEN PLOVER

CHARADRIIFORMES

American Golden Plovers are a conspicuous sight in their breeding grounds, where they nest in the open, dry Arctic tundra, and display aggressively to neighbors to protect their breeding territories. Some individuals are also territorial in the wintering grounds, far to the south in Patagonia, protecting a patch of the coastal mudflat where they spend most daylight hours foraging. On the breeding grounds, males settle near suitable nesting sites and scrape a hollow in the ground for the nest. They incubate the eggs during the day, while the females incubate at night.

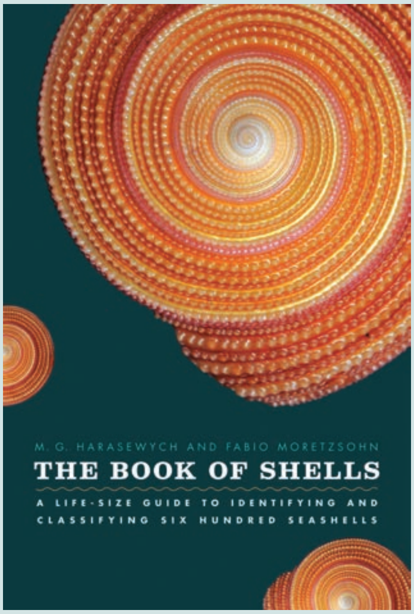
This species is also conspicuous when it forms large flocks during migration, and moves directly south from the East Coast of North America to the eastern shores of South America, without a stop-over. It has been said that Columbus himself may have noticed flocks of Golden Plovers flying south over the open ocean as his ships were approaching the Caribbean after spending 65 days at sea sailing from Europe.

Clutch

The egg of the American Golden Plover is white to buff in background color, and heavily blotched with brown and black spots. It measures 1⅞ x 1⅓ in (48 x 33 mm) in size. The chicks hatch fully downed, leave the nest within hours, and can feed themselves within just one day.

Actual size

Also Available



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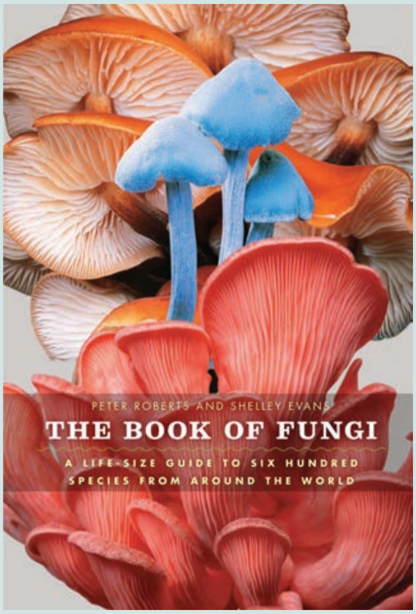

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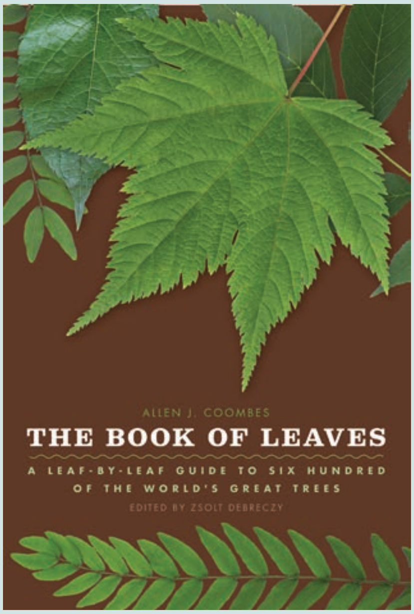

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