

ORNITH
Sargent
SK
321
F95

CORNELL
UNIVERSITY
LIBRARY



LABORATORY
OF ORNITHOLOGY
LIBRARY

Gift of

LABORATORY OF ORNITHOLOGY
CORNELL UNIVERSITY
ITHACA, NEW YORK

WILLIAM DUNKAP SARGENT

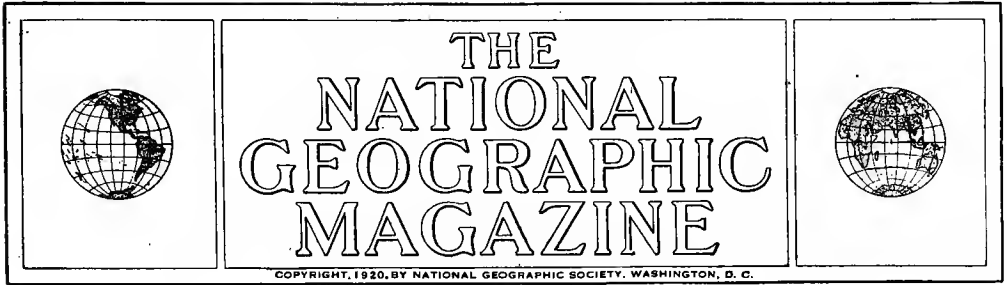
1935

CORNELL UNIVERSITY



The
WILLIAM D. SARGENT
Collection

• *A Gift to the Laboratory of Ornithology* •



FALCONRY, THE SPORT OF KINGS

Once the Means of Supplying Man's Necessities, It Has
Survived the Centuries as One of the Most
Romantic Pastimes of History

By LOUIS AGASSIZ FUERTES

Illustrations in Color from Paintings by the Author.

IT WILL surprise many to learn that the art of falconry, or hawking, goes back to the remote and unwritten past. We have many proofs of this in the frescoes and sculptures of the early Egyptians and Persians. And in all the time that has passed since that early day there has never been a total lapse of the art; falconry has in every age been carried on in some part of the world. Reference material is found in books not only of England, Holland, France, Italy, and Spain, but of China, Japan, and Russia, while the sport has been followed from immemorial time in India and northern Africa.

The ancient Greeks apparently knew nothing of falconry, but the Lombards, settling in north Italy about 560, knew of the art, and by 875 it had become a generally known practice throughout western Europe and Saxon England. From that time it thrived, filling an important place in the life of the times.

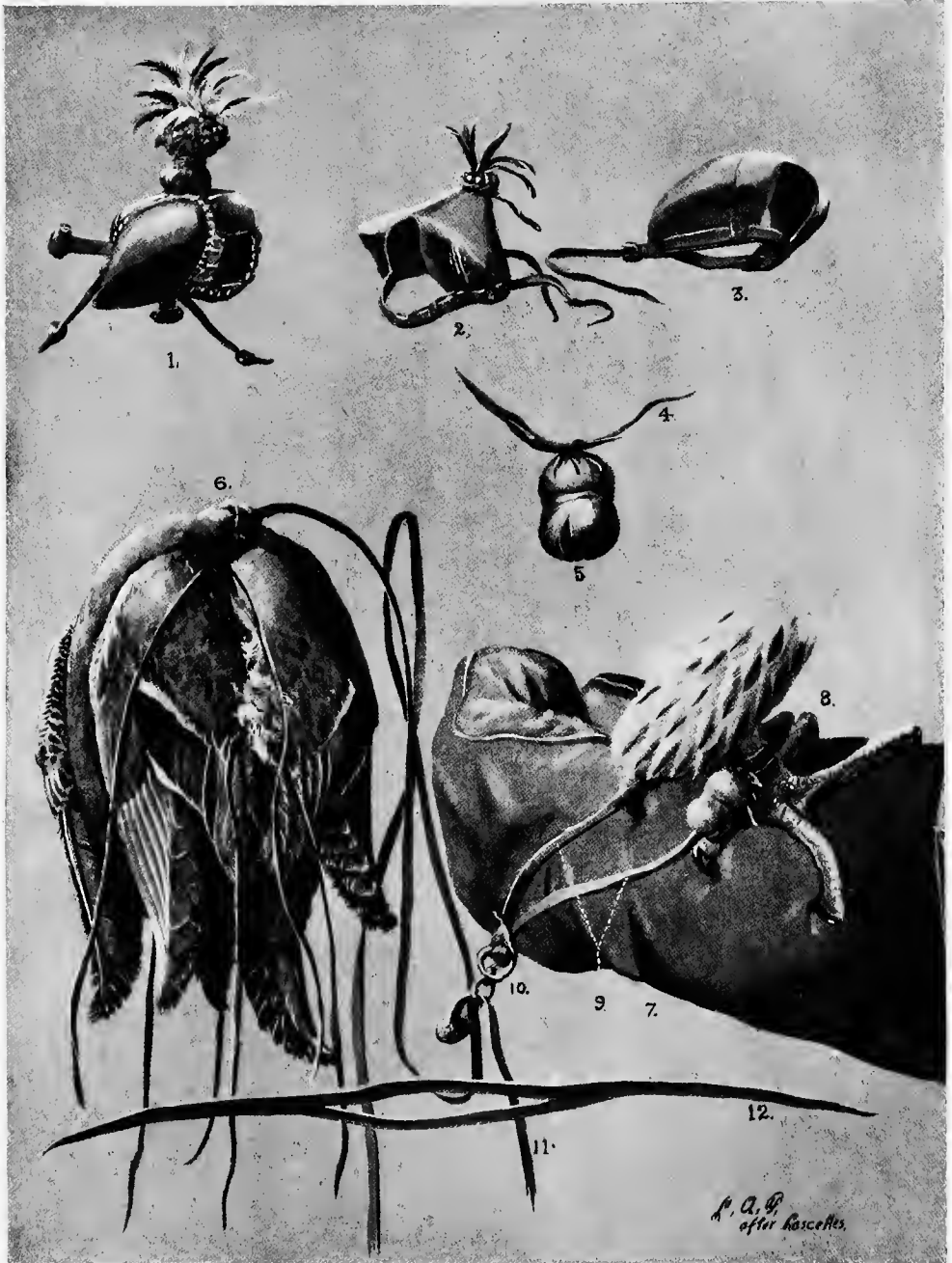
RETURNING CRUSADERS WERE ENTHUSIA-
STIC DEVOTEES OF FALCONRY

A vast impetus was given to falconry by the returning crusaders, who had become familiar with the methods of the

Orient and had brought with them both falcons and trainers. War lords never left their courts without their falconers and a cadge of hawks, to be flown at anything that might be deemed worthy.

The gun, of course, delivered a serious blow to the art, as it provided a quick, sure, and inexpensive way of getting meat. Still, the real devotees were never greatly affected by this device, and through the centuries, up to the rebellion in England, and later through the French Revolution on the Continent, falconry survived the difficulties imposed by the introduction of firearms, the breaking up of the country into small holdings, the reclaiming of large areas of wild land, and other inevitable changes incident to a multiplying and advancing population.

As a general practice, however, falconry in Europe ceased after the great social upheavals mentioned. Its maintenance as a sport since then is attributable in large measure to half a dozen hawking clubs, among which are the Falconers' Club, the High Ash Club, and the Loo Club in Holland. There were probably thirty or forty private establishments in England in 1914, but no doubt the World



Drawing by Louis Agassiz Fuertes (after Lascelles)

TRAPPINGS AND GEAR USED IN FALCONRY: "HAWK FURNITURE"

(1) Dutch hood, commonly used on all but newly caught hawks; (2) Indian hood, preferred by some falconers for the same use as the Dutch hood; (3) Ruffer hood, for newly caught hawks, made of soft leather and open behind, merely covering the eyes; (4) Bcwit, a light strap by which to hold on the bell; (5) Indian bell, the type preferred to all others; (6) Lure; (7) Glove or gauntlet; (8) Method of attaching the bell and jess to falcon's foot; (9) Jesses, light straps permanently attached to falcon's feet; (10) Swivel, through which is passed the leash; (11) Leash, by which the hawk is held till quarry is sighted; and (12) Brail, a slit strap that goes over one wing and is tied around the other side of the hawk, to prevent it from "bating," or flying off when still wild.

War has made a heavy toll on both the personnel and the support of the sport.

Within the last twenty years there had been a great renaissance of amateur falconry among the English, and some rather successful attempts have been made in America, particularly in the Genesee Valley, New York.

The great expense of maintaining the birds, due to the scarcity of experienced trainers and catchers, and the difficulties of forwarding so rangy a sport in the settled conditions of most of our eastern country have made it impossible, however, to achieve any real success in America and the growing sentiment against killing all but a few species of game-birds will probably act as a further deterrent. Still, there are several common birds which are recognized as game that would make admirable quarry for the peregrine, notably the quail of our Atlantic States and the sharp-tailed grouse of the northern prairies. The native wild goshawk is already the chief problem of all the grouse of our northern wooded section.

HAWKS ARE AMONG THE SHYEST OF CREATURES

While it is true that in training hawks to hunt, as in all other animal training, advantage is taken of the natural proclivities of the creature in hand, nevertheless, it seems at first glance that these vigorous and intrepid birds are taught to go almost directly against their instincts. First of all, being among the wildest and shyest of creatures, they must be taught that man, instead of being their worst enemy, is really their best friend. Then the rest becomes comparatively easy, if no mistakes are made. But any one of hundreds of possible errors may undo weeks of patient and successful labor.

Then, too, since different kinds of game must be hunted at different times of the year and in different kinds of cover, either the same hawk must be trained first for one type of work and later for something entirely different, or different kinds of hawks must be used.

Of the hundreds of kinds of hawks, only certain ones possess the combination of qualities necessary for this beautiful and romantic sport. A hawk must be at once kind and fierce; it must be

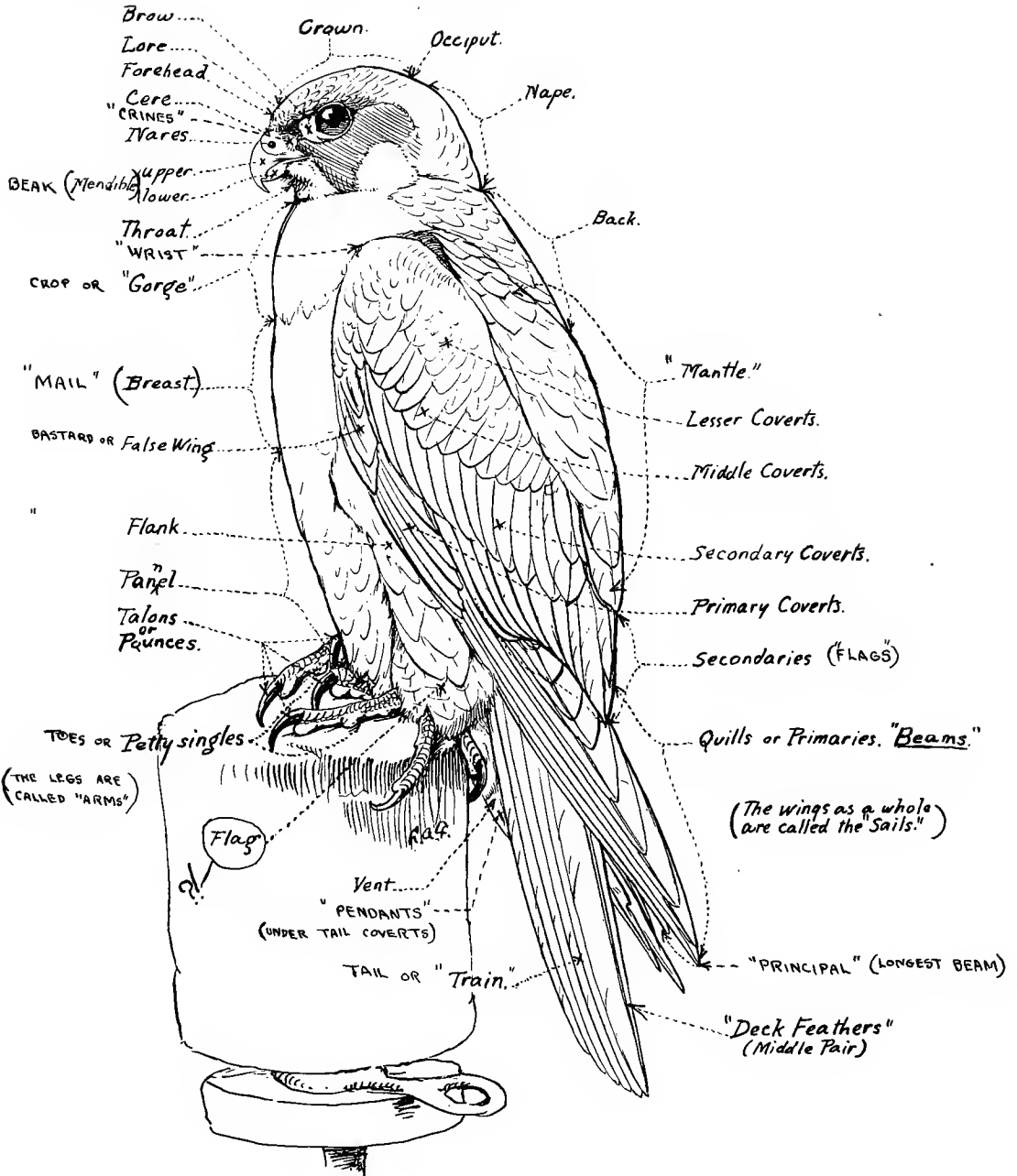
able to stand the changes of climate of its owner's country; it must be strong enough and swift enough to overtake and strike down its quarry, and intelligent enough to be able to unlearn much of its native knowledge. These qualities are possessed by only about a dozen species, belonging to two groups or genera—the true falcons, of the genus *Falco*, or long-winged hawks, and the short-winged group of forest-hawks known as "Accipiters." Only two of the latter are used, the goshawk and the European sparrowhawk. (The bird known in America as sparrowhawk is a small falcon which feeds principally on insects and is useless for hunting.)

THE PEREGRINE IS THE MOST COSMOPOLITAN OF BIRDS

The peregrine is the only falcon proper found all over the world. There is no other bird with such a cosmopolitan range. It is found on both sides of the Equator, throughout the entire world, nearly to the Arctic and Antarctic circles. It is natural, then, that this should be the falcon of falcons and known to all ages of man as a tractable and capable help in his search for food; for falconry was at first a very practical and even sordid pursuit, only later—much later—becoming the sport of the privileged classes.

A peculiar set of traditions and an equally picturesque language have become inseparably attached to the art of falconry; and it is only fair to the Scotch, who, in their conservatism, have been responsible for the colorful language of golf, to give them the credit for preserving the romantic terminology of falconry. It was in Scotland that the art was perpetuated after it had languished over most of Europe.

Ancient history is eloquent with the influence of the noble sport of hawking, the history of medieval Europe is richly colored with it, sixteenth and seventeenth century literature fairly abounds in passages concerning it, and the language of the day was so tinged with the jargon of the hawkers that it is fair to conclude that, before men had knowledge of gunpowder and the fowling-piece, hawking was such a general practice as to be the principal means of obtaining wild game.



Drawing by Louis Agassiz Fuertes

A CHART GIVING THE FALCONERS' NAMES FOR THE PARTS OF A HAWK

According to the "Boke of St. Albans," published about 1486, the kinds of hawks apparently used by the various elements in English society are given as follows:

Emperor ...	Eagle.
King	Gerfalcon and tiercil of gerfalcon.
Prince	Falcon gentle and tiercil gentle.
Duke	Rock falcon.
Erle	Peregrine.
Baron	Bastard.
Knight	Sacre and sacret.
Squire	Lanare and lanret.
Lady	Mezlyon (Merlin).
Young Man.	Hobby.
Yeoman	Goshawk.
Poorman ...	Tezcett.
Priest	Sparrowhawk.
Holywater	
Clerk.....	Muskayte.

THE FALCONER'S NAMES FOR HIS HAWKS

Falcons of the same kind differ so in performance and character, according to their experience before being taken in hand, that the falconer has separate names for each type, as follows:

Eyess is the name given to falcons taken from the nest;

Brancher is applied to young that have left the nest, but not the neighborhood of their infancy;

Passagers are birds of the year caught in the autumn migration;

Haggards are adult birds with two or more years of wild experience;

Falcon is strictly the female of any of the larger long-winged hawks, while the male, being nearly a third smaller and lighter in weight, is called the "tiercel" or "tarsel." In strictest usage (now generally ignored) the tiercel is the male of the goshawk, the larger of the short-winged hawks, while the male peregrine is the "light tiercel" or "tiercel-gentle" of Juliet's time. Being so much larger and stronger, the female, or falcon proper, has always received the greatest share of the falconer's regard and labor.

One who trains and hunts long-wings only is the true falconer, while the user of goshawks and sparrow-hawks is technically an Austringer or Ostringer, from the Latin *Astru* (French *Autur*), the generic name of these hawks.

The falconer has a special name for every part of his hawk and for everything he does.

Falcons are brought into subjection to man's will either by being taken from the nest just before they are able to fly or by being caught wild after they are fully grown and self-supporting. Those taken from the nest (eyess hawks) are the ones usually trained over most of Europe. Ordinarily they are much gentler and more easily trained, but lack the dash and style of the wild-caught birds known as "haggards." In India and Africa, however, the eyess is virtually unknown, as the hawks are always trapped adult.

THE BIRD'S TRAINING BEGINS

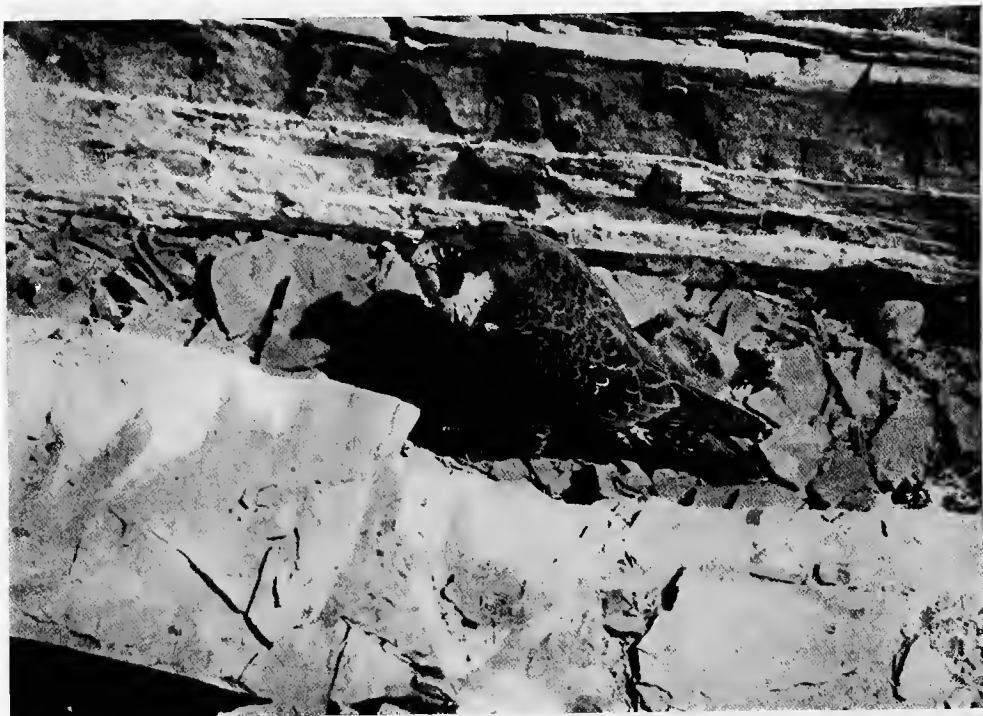
In the training of eyesses the procedure of the present day differs only slightly from that of the Middle Ages. Modern falconers use very much the same quaint medicines and nostrums and have the same names for falconine troubles as are so picturesquely described by Bert in his "Treatise of Hawks and Hawking," published 300 years ago.

The young hawks are left until nearly all the down has been replaced by brown feathers. Their removal from the nest takes place toward evening, when they are put in a hamper and sent to the falconer. It is highly desirable that as much as possible of their journey be made at night.

Arriving at their destination, they are placed in a roughly made nest and fed on chopped beef and egg, and a little later on fresh birds, rabbit, rat, or squirrel. All food should be tied to a board in a given place, to force the young hawks, which are otherwise free except for the bell and "jess," or leg-strap, to come to the same place for food.

The birds are now "at hack" until they learn to fly, and begin to stoop at live prey on their own account. They should be left entirely alone, and for the present the wilder they become the better; for should they come now to associate food with man's presence, they would at once start clamoring and screaming every time they saw a man—a most undesirable trick.

If properly "hacked," the young birds soon learn to make long flights into the surrounding country, returning at regular intervals to be fed from the shelf or feeding-board. They may be left in this state of virtual freedom for some three weeks,



Photograph by Guy Bailey

PEREGRINE FALCON AT HER EYRIE ON THE FACE OF A 400-FOOT CLIFF NEAR
ITHACA, NEW YORK

A pair of falcons has nested for many years in the same deep gorge. One July day sixteen pigeons were brought to the young hawks by the parent birds.

until they begin to catch prey for themselves. Then they are "caught up." It is time to catch them when they begin to be absent at the regular feeding time.

A bow-net is used in the trapping—a light twine net fastened along one side to a stick bent into a half circle, the free side being pegged down and the ends of the stick swiveled to pegs in the ground.

The net is folded back on the pegged side and a light cord fifty yards long tied to the middle of the bow. The trap is then baited with a tempting morsel, also pegged in place, and the bird is trapped when it comes to feed. The moment it is caught a soft leather hood, open at the back and known as a "rufter," is placed over its eyes and tied on, a swivel and leash tied to the jesses, and it is put down on soft grass with a block to sit on and left for an hour or two to settle down.

Its real "manning" (training to endure the presence of strangers) now begins. It must be carried on the gloved hand for

several hours each day, spoken to, and softly stroked until it begins to lose its nervousness and becomes reconciled to the hand as a perch. It may now be fed a little, and when it eats without hesitation the hood may be removed gently, in candle-light, and the meal nearly finished unhooded. The rufter must be replaced before the end of the meal, however, or the hawk will come to associate the hood with the end of its feeding time, and resent it.

When the bird feeds freely by candle-light it may be tried in daylight, and after this is accomplished it should be accustomed to the presence of men, children, dogs, and other creatures ordinarily frightful to it. This does not usually take many days.

MOST OF THE HAWK'S LIFE IS SPENT IN
DARKNESS

Now comes the hardest part of the manning—the breaking to the hood.

This is a delicate business, one in which many a fine hawk has been ruined, as a hood-shy hawk, whatever its other virtues, is of no use to its owner. Most of the hawk's life henceforth is spent in the darkness of the hood, which is only removed in the loft or at the moment when it is to be flown at quarry.

THE HAWK IS TAUGHT TO STRIKE AT A SWINGING LURE

Thus far our hawk has been fed always from the hack-board or from the fist; now the lure must be brought out and put into use. This is a padded weight (a horseshoe is excellent) with wings of teal or pigeon attached. It is also provided with strings for attaching food and a long string by which it can be dragged. The hawk is given a bite or two from it, when it is thrown to the ground, where the meal is finished.

For a time now the bird must be fed only from the lure.

As soon as the hawk recognizes the lure immediately and flies to it for food, it is given, hooded, to an assistant and "hooded off" to the falconer, who swings the lure some 200 yards distant. The bird probably will fly at the lure almost at once and in any case will discover and recognize it soon.

The lure is twitched out of sight just as the hawk goes to grasp it. At the second attempt the food tied to the lure should be awarded, and after a few repetitions of this the bird will seldom be far from its master when he has the lure with him.

The bird must now be taught to kill for itself, and a fledgling pigeon is a good subject for this. If properly trained to the lure, there is no danger of the hawk "carrying" (flying off with its quarry), which is a serious fault. After a few "easy" birds, a capable old pigeon may be flown.

The hawk, unless unusually good, will miss on this quarry, but on returning high in the air should be thrown an easy bird; then well fed and petted. It has probably learned from this that to succeed it must be above its quarry. After this is learned, the hawk may be flown at wild game.

This is the merest outline of the train-

ing of young hawks. It is an easy task, compared with the manning of haggard or passage hawks, which have for a season at least been accustomed to shunning man as the worst of all evils.

Hawks may be caught anywhere within their range, but by far the most famous place for this exciting (and remunerative) pursuit is in South Brabant, in Holland. Here, near the little village of Valkenswaarde, lies a great open moor, where thousands of passage birds go by in the autumn, followed by the falcons that prey upon them. From time immemorial—certainly well through the Middle Ages—falcons have been trapped and trained here for the nobility of all Europe.

In the heyday of the sport, emissaries from the courts of each little duchy and principality gathered at Valkenswaarde after the trapping and bought for their masters the product of the season's catch.

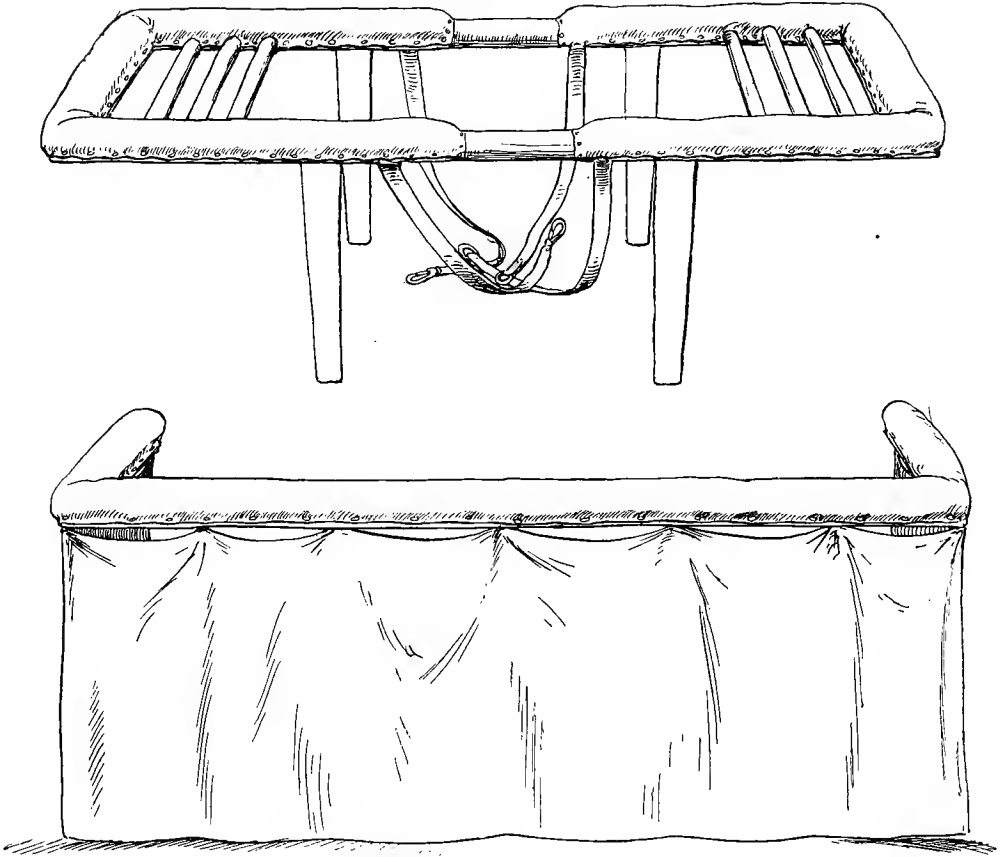
What a picturesque and lively scene these medieval auctions must have been, with knight bidding against knight for the beautiful birds that had been won out of the air and brought into the thralldom of man!

The old cult of falcon catching and training has never completely languished at Valkenswaarde, and the family of Möllens has for many generations led in the industry. Indeed, wherever falconry is practiced the Möllens are known as the most skillful and expert trappers and trainers, and many of the most famous falcons in the history of the sport have come from their able hands.

In capturing the "passage hawks," the trapper conceals himself in a sod hut, from which extend long strings to operate the net and the decoys used to lure the wild hawk within range from afar, after its approach has been heralded by the little telltale "announcer."

THE BUTCHER-BIRD IS THE TRAPPER'S SCOUT

Now, of all birds, perhaps the shrike, or butcher-bird, most cordially hates and fears its big competitor and ogre, the falcon. And the shrike can detect its enemy in the far, far distance much sooner and more infallibly than can man, even with strong glasses. Therefore, the skillful



From a drawing by Louis Agassiz Fuertes

UPPER FIGURE, FIELD CADGE; LOWER FIGURE, SCREEN CADGE, FOR HOUSING FALCONS

The carrier of the cadge was usually a country boy—a tenant of the owner of the hawks. From “cadger” came “codger,” a countryman, and doubtless cad and caddie, both typical Scottish derivatives only slightly different in their present-day applications.

falcon-catcher first traps his shrike and attaches him to a perch on a little sod mound with a retreat into which it may dive to safety when the hawk comes near.

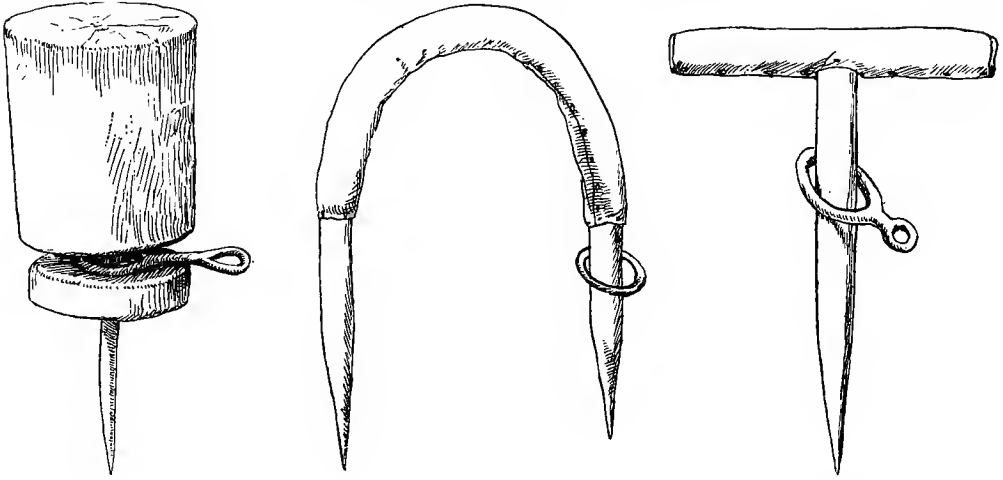
The shrike sits quietly on its perch until it sees a falcon in the distance, when it begins to chatter and scold, getting more and more excited as the falcon approaches, and finally actually “pointing,” thus giving the trapper ample time to have everything in readiness.

At the first sign, the trapper retreats into his hut and closes everything except the little peep-window and begins working his tied pigeon and the decoy hawk up and down on the elevated line, to attract the wild falcon’s eye.

The actual trap consists of a bow-net

set some fifty yards from the hut. Through a ringed peg driven in the middle of the net passes the tether to the bait, a live pigeon which is in retreat in a box a few feet away. When the falcon has come within a hundred yards of the trap the “lure” pigeon is dragged out, flapping its wings. The hawk prepares to stoop. At this moment the “lure” pigeon is dropped and dives to shelter and the “bait” pigeon is drawn out of its box into view. When the hawk has struck, the victim and victor are drawn gently into the exact center of the net, which is then sprung by means of a line from the hut.

The falconer loses no time now. He runs out to the trap, fastens jesses to the



From a drawing by Louis Agassiz Fuyertes

BLOCKS AND PERCHES, FOR "WEATHERING" HAWKS

The falcons are all rock-dwellers by nature and are most comfortable when perched on a flat surface; hence blocks are used, with a swivel to prevent the leash from getting tangled up. The short-winged forest hawks, like the Goshawk and Sparrowhawk, have enormous claws, which are greatly in the way on a flat surface, and are therefore weathered on slender "bow" perches. The T-perch is used for eagles.

hawk's legs, and puts a sock over his captive's head and body with as little fuss and excitement as possible—an operation calling for great skill and dexterity. The captured hawk is then hurried to the hut and laid on its back and all is made ready for another attempt.

The training of a haggard hawk is in many respects similar to that of an eyess, but with this vast difference: the eyess, taken young and with no fear or hatred of man, requires simply to be led to do the will of its master, whereas the haggard has to be redeemed by patience and kindness from a state of fierce enmity and suspicion into one of complete docility and submission, and has to unlearn all the teachings of its experience and instinct and learn the will of its new master.

The trainer takes his new hawk to the loft and there removes the sock, replacing it with a soft rufter hood.

It would take too long to tell in detail all the many difficulties that lie before the falconer; but, with no accidents and much skill, patience, and understanding, a fully adult haggard peregrine may become accustomed to the presence of man and his works in a fortnight. This is accomplished by requiring the newly caught

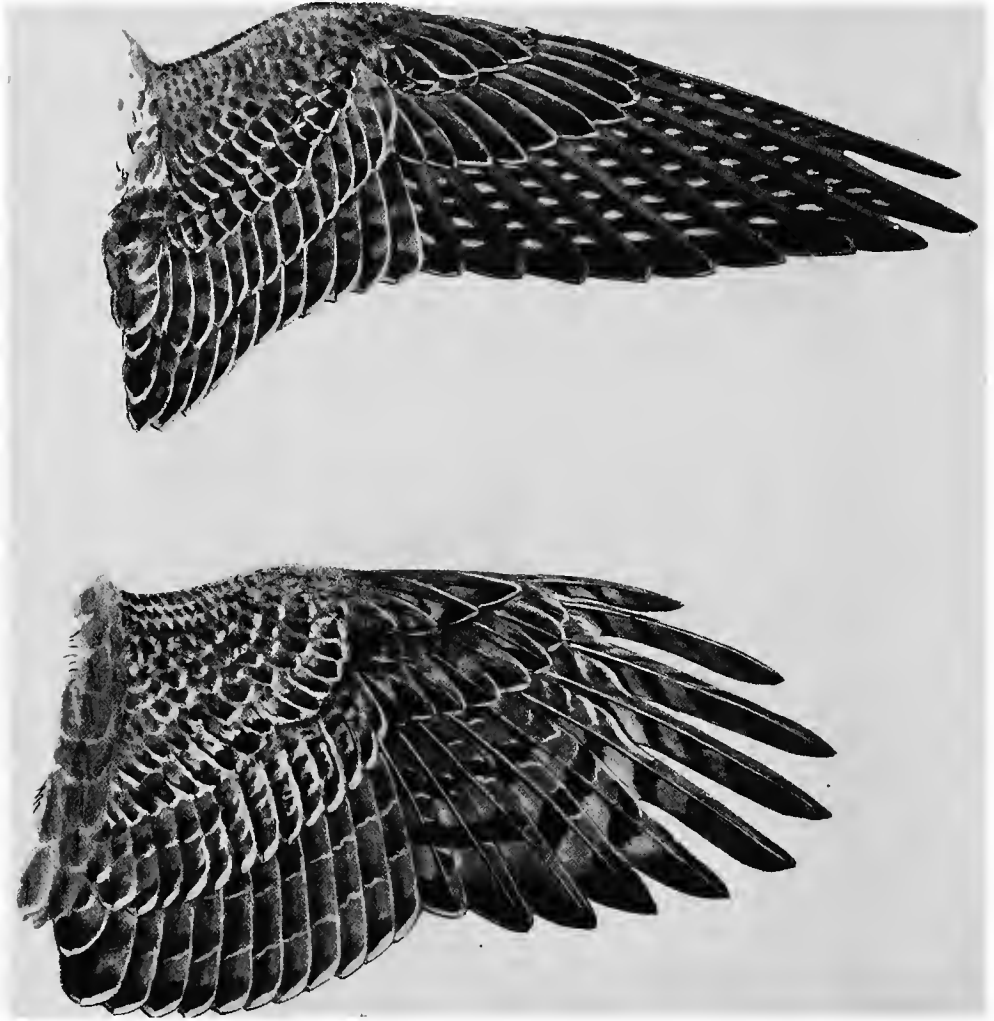
hawk to sit for hours and hours upon the hand and by depriving it of any chance to go to sleep until it is thoroughly reconciled to the new condition. It is then gradually allowed more light and more ease and rewarded with food as its docility progresses.

In some respects it is easier to train the haggard than the eyess to hunt, for the former has long killed for itself, while the food of the eyess has been furnished by its master. Eyesses are usually more tractable and run truer to "form," but the haggard almost invariably has vastly more dash and style than its house-bred loft-mate.

The style of action and methods of hunting are so different with the long-winged hawks and their short-winged cousins that they had best be considered separately.

THE "LONG-WINGS" ALWAYS ATTACK IN THE AIR

The "long-wings," or falcons proper, by nature strike their prey in the air, killing it clean by the direct blow they deliver at the end of their "stoop." They battle for position in the air, attaining their "pitch," or position above their



Painting by Louis Agassiz Fuertes

WING OF FALCON, OR LONG-WINGED HAWK (UPPER), AND WING OF GOSHAWK, OR SHORT-WINGED HAWK (LOWER)

The Long-wing is adapted to swift flight in the open, being flat, long, narrow, rigid, and unbroken to the end, only the outer feather being notched, and that only for a short distance. The Short-wing is adapted for precipitate flight in cover, being short, broad, deeply cupped, elastic, and with the "ailerons" deeply notched on at least five feathers.

quarry, by circling or "ringing," and, when sufficiently well placed, dashing down headlong, hitting their quarry a resounding blow that often can be heard a long distance, following it down and striking again if necessary, but never "binding" to it, and never striking quarry that is sitting or on the ground.

Falcons proper are always hunted in open country, where the quarry is either

located and flushed with dogs or beaters and the hawk flown from the falconer's wrist, or the birds are trained to "wait on." In the latter case, upon being unhooded and flown, they ring up and up, attain their "pitch," wait for the game to be flushed, and when it is well under way make their terrific stoop.

On large game, like heron, falcons are often flown in "casts," or pairs, and take

turns stooping in rapid succession until the quarry is killed.

In the good old days many kinds of hawks were used, but those most esteemed, because of their size, style, and beauty, were the gerfalcons of the north. Centuries ago the Icelanders caught and trained both old and young birds, and the annual catch sometimes amounted to hundreds.

In general, however, the gerfalcon does not seem to thrive in England or on the Continent. It wilts in the summer and becomes listless, refusing to fly, and finally fading and falling prey to some one of the many ills that beset hawks. This seems to point to a great skill and knowledge on the part of the medieval falconers, who certainly used the gers very extensively and successfully in killing the kite, a most capable hawk, then common all over Britain and Europe.

WHEN THE DESERT FALCON HUNTS THE GAZELLE

The sacre, a "desert falcon," nearly as large and heavy as the gerfalcon, is still used in India for hunting the kite, and probably this is the most thrilling quarry that has ever been used in falconry. The kite is a magnificent flier and spends much time at an altitude of thousands of feet, so that the actual battle often takes place so high as to be almost out of sight.

Another spectacular use to which the sacre is put is in the hunting of gazelles and of bustards. The falconer and his field are mounted on swift horses, and in the gazelle hunt three, five, or more hawks are cast when the quarry is started. It is an exciting chase, full of danger for every one concerned—the riders, because of the chase over rough country; the quarry, because of the number and intrepidity of his assailants; and the hawks, because in their dashing stoops they are frequently impaled upon the horns of their quarry.

The Houbara bustard, a large plover-like bird the size of a turkey, affords a spectacular chase. He does not fly, but, with wings and neck outstretched, runs like a cloud-shadow fleeting over the plain. The hawks, three or more in a cast, pursue and worry their quarry for miles over the desert, only striking the

fatal blow when the bustard has become nearly exhausted, as by that time have also such horses as have been able to keep up with the terrific chase.

THE PEREGRINE IS THE FALCON OF FALCONS

The peregrine, falcon of falcons, is not as large or as strong as either the gers or the sacre, but combines, with a hardihood unknown to the "exotics," all the qualities that go to make a good hawk—gentleness, teachability, courage, dash, willingness to "wait on" at a great height, and, most important of all, availability; for, as has been said, the peregrine has a worldwide range, and is therefore obtainable in almost any country where men want to use it. In this article, then, unless specially noted, the peregrine is the subject of the narrative.

In a wild state, were it a common bird anywhere, it would be a very undesirable neighbor, for it preys almost exclusively on birds, and is capable of taking such swift and resourceful game as plover, snipe, and wild-fowl. Its common name in America, the duck-hawk, is well given, the reference being to wild ducks and not the tame bird.

Like many another brigand, the peregrine prefers easy prey to difficult, is in nowise averse to poultry, and is particularly fond of domestic pigeons. A pair whose eyrie I watched on a 400-foot cliff near my home one July day had three young on the wing. During the middle of the day there was little activity and all the birds sat quietly pluming and resting; but for the first three hours in the morning and the last three in the afternoon, one old bird or the other returned about every twenty minutes with a pigeon. On that one day sixteen pigeons were brought to the young.

Of course, this was more than they could eat entirely, and much more per capita than grown birds would consume, but where an adult hawk will keep in very fine condition on half a pound of fresh game a day, a growing fledgling requires above its own weight daily of animal food in order to maintain its miraculous growth and the great physical effort of producing an entire coat of feathers.

There are many recorded instances of

the wild peregrine's adaptability to the easy life of great cities, where congenial nesting and roosting places are found in the belfries, towers, and lofts of the public buildings and pigeons in abundance are available. For many winters an old peregrine appeared in Washington, haunting the Post-Office Department building tower as a lookout, sallying forth whenever it was hungry, making a clean kill on pigeon, and returning to the post-office roof to plume and eat its prey. A member of the Biological Survey went on top of the building and collected a large number of leg-rings from carcasses that had been left by this bold and capable brigand.

A fine old female peregrine I once took from Pajaro Island, in Mexico, was living on white ibis from a convenient rookery, and her lookout tree was well surrounded by the bleached and weathered carcasses of her victims. I fancy her demise was a welcome event on the island.

Many stirring accounts are current of the courage and tenacity of purpose these hawks possess, but one of the most striking is of an eyess falcon belonging to a Major Fisher, which was flown at a woodcock near Loch Eil. Both birds mounted at once, higher and higher, until they were entirely lost to view, even with powerful glasses. After considerable time, however, a tiny speck was seen falling out of the sky, and the woodcock, closely followed by the thunderbolt in feathers that had struck him, fell toward the very patch of fern from which he had been flushed. Before hitting the ground, however, the hawk had again overtaken her victim and struck him stone dead in air. After so long a chase the falcon was well fed up, and, so far as she was concerned, her master wisely "called it a day."

The "Old Hawking Club," organized in England in 1864, always maintained a fine cadge of hawks and kept careful records of individual performances. Between August 12 and September 14 one year, the club's prize bird, "Parachute," a two-year-old eyess falcon, killed 57 grouse, 76 partridges, 5 pheasants, 3 hares, and five birds of miscellaneous species.

"General," a falcon belonging to the Duke of Leeds, killed in 1832 129 out of 132 flights, mostly at partridges. "Vesta" was flown in Scotland in nine successive years, averaging 33 grouse a season. This is an unusually long life of activity.

A glance down the records of famous clubs and of private owners reveals many interesting and romantic names, such as the falcons "Lady Jane Grey," "Empress," "Buccaneer," "Black Lady," "Comet," "Destiny," and "Will o' the Wisp"; tiercels "Druid," "Butcherboy," "Mosstrooper," "Vanquisher"; merlins "Tagrag," "She," "Ruy Lopez"; sparrow-hawks "Blanche," "Lady Macbeth," and "Faerie"; goshawks "Enid," "Isault," "Geraint," "Tostin," "Sir Tristram," and for variety "Gaiety Gal" and, grimmest and truest of all, "Shadow o' Death."

A FAMOUS FLIGHT BY "BOIS-LE-DUC"

"Bois-le-duc" was a haggard falcon of fine qualities, and the following, quoted from Lascelles, gives us a lively picture of a rook flight by this famous hawk:

"We take up our position behind a stack to wait for a rook passing on his way from the rookery in the valley to the sheepfold on the hill. Presently we see one coming, toiling slowly over the shoulder of the down.

"Shall we fly one of the young falcons lately entered and coming on so well, or shall it be the old heroine of a hundred flights, victress over more than double that number of rooks, that flies now her fourth season with all the vigor and dash she displayed in the blinding snowstorms and heavy gales of her first year?"

"A hundred or two yards is far enough for a slip with a young hawk, but with a real good one a quarter of mile is not too far, while many and many a time, if the wind be right for her, the old hawk has been slipped at rooks a fair half mile away.

"It looks as if this slip would be too far for a young hawk, so the handsome old falcon is taken on hand, to the delight of the whole field, not one of whom, however large it may be, but will stay out 'just one half-hour more' when it is announced that it is the turn of old 'Bois-le-duc' to fly at the next chance that occurs.



FALCONS WEATHERING

Every pleasant day the falcons are put out on their blocks in the open air, unhooded, for an hour or two, where they preen and plume themselves, and get their fill of fresh air. It also keeps them good natured and contented in each other's presence. The birds shown here are (1) Greenland Gerfalcon, (2) Iceland Gerfalcon, (3) European Gerfalcon, (4) Goshawk, (5) Haggard Peregrine, Tiercel (6) Red or "Soar" Tiercel Peregrine, (7 and 8) Red or "Soar" Tiercel Peregrine, (9) Tiercel Peregrine "rousing."



Abbas equine Guites.

A FAIR HIT: GERFALCON STRIKING HERON

When Knighthood was in Flower the favorite game of every overlord (who alone was entitled to use the Gerfalcon) was the stately heron. Modern falconers seem unable to adapt these splendid northern hawks to present conditions, depending almost wholly upon the native peregrine. But in the fourteenth century a gerfalcon was indeed a kingly gift, and one often employed when the goodwill of a near or distant potentate was particularly desirable. In attacking, the gerfalcon climbs above the heron then "stoops" with great force at her quarry. There is no truth in the legend that the heron, as a means of defense, sometimes impales the descending enemy upon its dagger-like beak.



TIERCEL GENTLE: A HIT ON GROUSE

Scotland must receive the credit for perpetuating the "Noble Art" when it had languished over the rest of western Europe, and no quarry is better suited to the capacities of the Peregrine, or "Gentle Falcon," than the Scotch red grouse. But the "gentle" part is forgotten when the hawk makes its thunderbolt assault, diving on its victim from a height or "pitch" of hundreds of feet, usually killing it clean with a single resounding blow of the half-closed fist. A good falcon will never seize or "truss" its quarry.

The term tierscel (meaning the male of various species of falcon) is derived from the Latin *tertius*, according to some because every third bird in the nest is supposed to be a male; according to others because the male is supposed to be a third smaller than the female.



GOSHAWKS: AN ADULT TIERCEL (MALE) AND A YOUNG FEMALE

These are the fiercest and most competent killers of all, and therefore used principally by the "yeomanry" as meat getters. They are in "red" plumage for the first two years of their life, afterward becoming slaty-gray above and barred below. They require careful watching in the mews (the buildings where the hawks are kept), lest they break loose, when they will go systematically about killing every other bird in the loft. They hunt on or near the ground, and, unlike the falcon, come to earth with their quarry. Among all hawks, the female is larger and more powerful than the male.



GOSHAWK STRIKING PHEASANT

Unlike the true falcons, the short-winged Goshawk hunts ground-haunting quarry, and trusses (holds) to its victim till the latter ceases to struggle, no matter how fierce and rough the tussle may be. It kills by the vice-like squeeze of its piercing talons, instead of by the terrific blow of the half-open foot, as do the true falcons. "Red Queen," a famous goshawk of the "Old Hawking Club," had an authentic record of sixteen hares out of seventeen struck in a single morning.



HAWKING IN THE CAUCASUS

All through the Near East, particularly in Georgia and Daghestan, hawks are still used as game-getters. Goshawks are principally employed, being the most prolific killers, and the rough nature of the country making it impossible to follow the long flights of the true falcons. The quarry, mostly pheasant, partridge and hare, is located by dogs, and the goshawk flown from the hunter's wrist as the game is flushed.



A HAWKING PARTY IN ELIZABETHAN ENGLAND

When firearms came into general use the splendid sport of Falconry, as a general practice, received its death blow. But in Shakespeare's day it was at its height, and the literature of Medieval England is full of spirited references to "the Sport of Kings." The colorful and picturesque costume of that day must have lent great charm to the scene when prince and princess, knight and lady, squire and dame rode forth, hawk on fist, to fly their favorites at rook or heron.



THE START: ARABS SETTING OUT WITH FALCONS TO COURSE GAZELLES

It is difficult to tell just when hawking began. The Arabs, perhaps as early as any other people, trained certain hawks to course the swift desert game. In coursing gazelles three, five or more hawks are used, and the aid of dogs is required for the actual kill, the hawks worrying and bewildering the game until the dogs can catch up. These hawks are always fed from the eye-sockets of a calf's head, and naturally turn to this spot in their living quarry. There is great danger that the hawks may be impaled on the horns of the gazelle.



HUNTING THE BUSTARD WITH FALCONS IN NORTHERN AFRICA

This is one of the most thrilling of all uses of the falcon, for the chase often continues for many miles over the rough desert, where only the stanchest horse can follow. The size and stamina of the quarry, combined with the habit of fleet running instead of flying, make it very hard as well as dangerous for the little lanner falcon to kill, as there is so little space to turn away from the ground after the stroke.



A SPARROWHAWK MAKING A TRY FOR A BLACKBIRD

Although too small and slight for "regular" game, the European Sparrowhawk, which closely resembles our Sharp-shin (see color plate XVI), is uncommonly fierce and courageous, and makes spirited dashes at such quarry as starlings and blackbirds. It is a hedgerow hunter, depending for success upon the intrepidity of its onslaught and the pertinacity with which it follows its victim. It will even run through thick cover after skulking quarry.



Photograph by L. Olivier (Paris)

AN ALGERIAN FALCONER: BISKRA, NORTH AFRICA

Falconry had its rise in man's early necessity in man's birthplace, Central Asia, where it has thrived almost without interruption ever since. The sport has from immemorial time been followed in India and Northern Africa.



Photograph from Louis Agassiz Fuertes

THREE CAST OF FALCONS, ON THE CADGE, HOODED AND READY FOR A JOURNEY

Marco Polo describes the hunt of a ruler of Manchuria in which about 10,000 people were engaged, and over a thousand trained falcons were employed. Everything was done to insure the sumptuous ease of the great man, who was not disturbed until the quarry was overhead, when he slipped his favorite falcon and the hunt was on. Modern falconers insist on seeing all the fun, from the flushing of the game to the stoop and kill.



Photograph from Louis Agassiz Fuertes

TRAPPING FALCONS AT VALKENSWAARDE, HOLLAND

Here, since the middle ages, falcons have been caught for use all over Europe. The outfit consists of the trapper's blind, from which run four lines: one to each pole, by which a decoy hawk and a "jure" pigeon are brought out of their sod retreats into involuntary action; the third to the "bait" pigeon, bringing it from its box into the open trap-nest; and the fourth to spring the net when the wild hawk has struck. On the sod retreat toward the right sits the captive shrike, which announces the advent of the hawk.



A CAST OF FALCONS ON THE WRIST: HOLLAND

The birds are carried hooded until the game is started. Then the hood is doffed, the leash slipped from the swivel and the falcons cast off, singly, unless the game is large and powerful. The rest lies with the birds.



Photograph from Louis Agassiz Fuertes

**FALCONER TAKING HAGGARD PEREGRINE FROM THE BOW-NET,
LURED THITHER BY THE BAIT PIGEON**

Nearby is the "sock" into which the hawk will be thrust, while jesses and bell are attached to the legs. Much skill and dexterity are required, for an outraged falcon is no easy thing to handle, and can inflict severe punishment with its great needle-sharp talons. The beak, though a capable weapon, is not used, even in self-defense.



HAWKS THAT ARE THE FRIENDS OF MAN

Large, conspicuous hawks are all of great economic value, being the principal natural check on the hordes of noxious rodents that, if unmolested, would soon render agriculture unprofitable. The large soaring, circling hawks of the open country are not the ones that molest the farmer's poultry, but *are* the ones that hold in check the field-mice, gophers, ground-squirrels, mole-cricket and grasshoppers that annually cost the country many millions of dollars through their depredations on crops, orchards and forage.



ONLY FOUR MEMBERS OF THE HAWK FAMILY ARE OUR ENEMIES

The four hawks whose names are underscored are the ones that give a bad name to the whole hawk family. Of these the Cooper's Hawk is most important because commonest and most widely distributed. The Goshawk, restricted to the Northern wooded region, is terribly destructive to game birds and to poultry. The Sharp-shin, an inveterate bird-killer, is too small to molest poultry, except chicks a few days old. The Pigeon Hawk is not important, being quite rare.

"All is hushed as the rook, a single bird, presumably a strong old cock, comes slowly up. He passes us and is going nicely on when something about the party awakens his suspicions and he gives a sudden swerve that in one second takes him about 150 yards off on a side wind.

"We are not to be done this way, though, and in a moment the head of our party, with falcon on hand, dashes out at a brisk gallop down wind of the rook, which hastens up on wind. But a hundred yards or so is no matter to us with this hawk, and the moment we are fairly down wind of him the old hawk is unhooded and flung off; and the falcon is in hot pursuit of her quarry, rising with each stroke of her powerful wings till she seems to shoot upward like an arrow from the bow.

"The rook has seen her, and is making his way upward at no mean rate; but the pace of the falcon is too much for him, and ere long she is above him. Poising herself for a moment, she comes, with one terrible perpendicular stoop, straight at him.

"It would seem as though nothing could escape; but our rook is equal to the occasion, and with a clever shift he has dodged her attack by a good yard or more.

"WELL DONE, ROOK"

"Well done, rook!" but there is clearly now no safety for him in the air, for the falcon has shot up again, with the impetus of her stoop, to a height scarcely inferior to that from which she descended; so, turning his tail to the wind, he makes all possible haste to a small patch of thorns that promises a temporary shelter, having, however, on the way to evade two similar stoops from the hawk, almost as fine as the first.

"Alas for friend rook! On reaching the covert he finds it already occupied by the enemy, in the shape of the excited field, who soon drive him with halloo and crack of whip from his shelter, and compel him again to seek the open. The falcon has, however, strayed a little away; so he starts with might and main to ring, in spiral curves, into the very clouds.

"After him starts the hawk, but soon finds that really good rook, such as this is, can mount nearly as fast as she can.

"Up, up they go, gradually becoming smaller and smaller. Ring above ring does the falcon make, yet without getting above him, till, apparently determined to gain the victory, she starts off into the wind to make one tremendous circle that shall attain her object.

"Steadily into the wind she goes, the rook striving to follow her example, and appearing from below to be flying after the hawk. At length, as she almost completes the outer circumference of her circle, the rook, perhaps feeling his powers exhausted, turns down wind, and, at a great height, makes off as fast as he can go.

"Surely the flight is over, for the falcon is still working away, head to the wind, as hard as she can—in fact, the two birds are flying in opposite directions, half a mile apart. 'Not a bit of it,' say the initiated, who are off down wind as fast as they can ride.

A MAGNIFICENT STOOP, AND VICTORY!

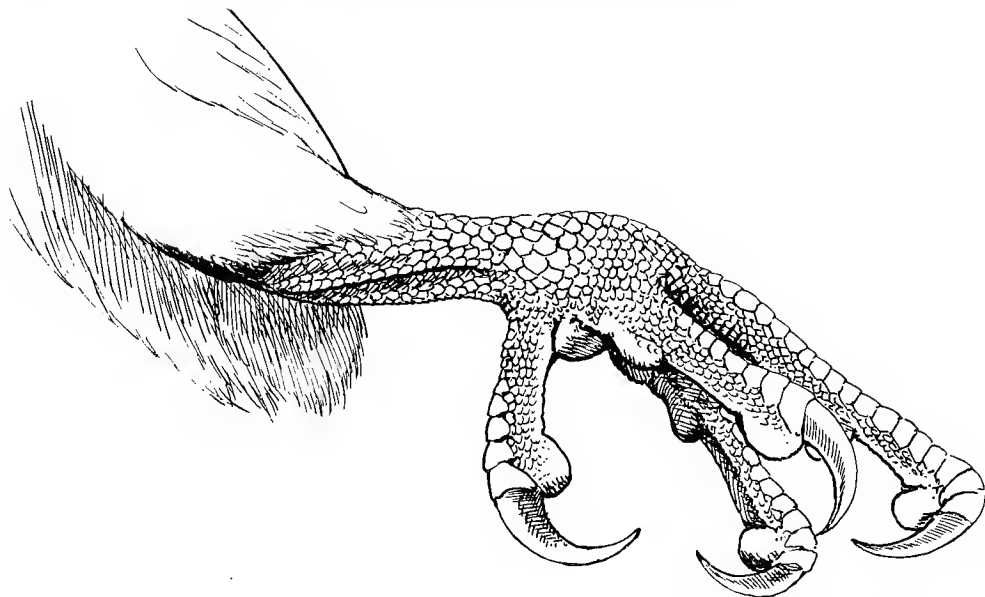
"In another moment you see the falcon come round, and though at such a height she looks no bigger than a swallow, you can see that she is far above the rook, while her pace, slightly descending as she is, is almost that of a bullet. So thinks her quarry, apparently; for, shutting his wings, he tries to drop like a stone into a clump of trees now nearly beneath him.

"Swiftly as he drops, there is a swifter behind him, and down from that terrific height comes the falcon like a thunderbolt. Lord, what a stoop!

"By the powers, she has missed! And now surely he must escape.

"But no. Shooting upward like a rocket, the old falcon puts in one more straight, swift stoop, and the rook is taken just as he enters the sanctuary which he has had his eyes on from the first. Whoo-who-op! A grand ring! a magnificent stoop! a splendid flight! Bravo, 'Bois-le-duc!'"

Among the smaller falcons the merlin, hobby, and kestrel are the only ones now used, and, indeed, the kestrel, being largely a locust and mouse feeder, seems to be rather beyond the skill of the modern trainer, though there are abundant proofs that it was used in medieval times. This is a beautiful and gentle species and



Drawing by Louis Agassiz Fuertes

THE FALCON'S FIST

Falcons kill their prey in full flight, by a terrific blow with the half-closed foot, returning after the strike to pick up the victim (see Color Plate II).

it is a pity it cannot be more profitably used.

TRAINING THE SHORT-WINGED HAWKS

Thus far nothing has been said of the training and hunting of the two short-winged hawks, the goshawk and the sparrowhawk.

Just as the falcons, with their long, narrow wings and compact bodies, are adapted to the chase in the open, with wide maneuvers and great stoops through unbroken space, so these rangy, slim-legged birds, with their short, "broad-fingered" wings and long, sweeping train, are beautifully adapted to work in the tangles and forests, where they naturally live.

These birds seldom come out into open country unless there is some tempting poultry yard or game preserve where a quick sally is assured of its reward. When such a larder is discovered, however, little peace comes to the owner until the marauder has been brought to earth, for it will take its daily toll until the yard or cover is depleted.

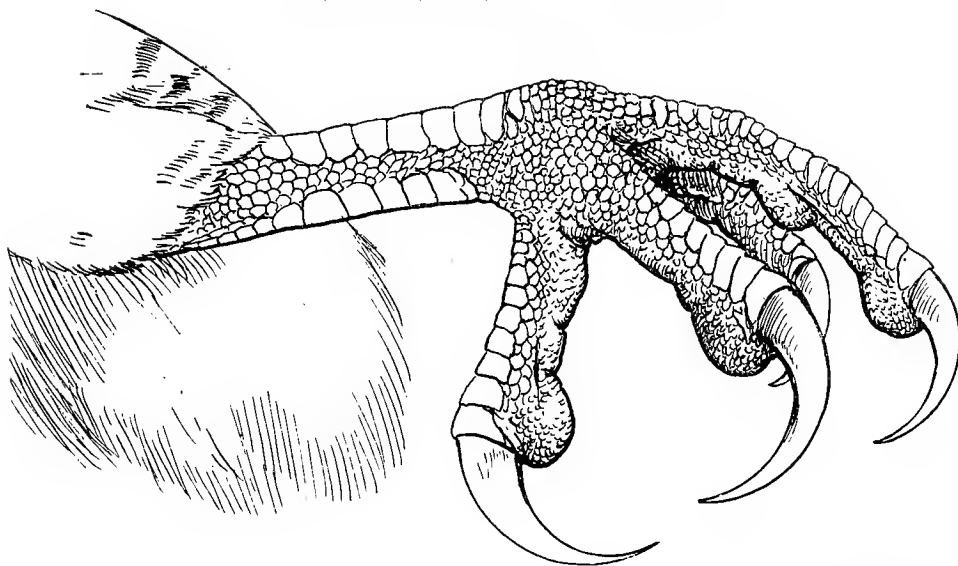
Goshawks and horned owls are generally to be feared in cold winters on all

extensive game covers in this country, and they make sad havoc with the work of years when once they infest such a place (see text, page 461).

The goshawk is a very different creature from the falcon, and by its nature and style of hunting is fitted for entirely different work; for the goshawk does not strike its prey in air and return to it after the turn, but pursues it and binds to it at once, whether in air or, as it prefers, on the ground. These hawks have a curious habit, too, of covering their quarry with their outstretched wings and tail until it ceases to struggle.

THE GOSHAWK'S FEET ARE ENGINES OF DEATH

The feet of the goshawk are veritable engines of death, with enormous talons and great strength. Whereas a falcon's foot is more like a fist to deliver a terrible blow, the short-wing's feet are like great ice-tongs with semicircular claws nearly an inch long, which enter the very vitals of the quarry and kill as tough a creature as a rat or a hare in a few seconds and take the life of any bird almost instantly (see drawings on this and the opposite page).



Drawing by Louis Agassiz Fuertes

DRAWING OF THE FOOT OF A GOSHAWK (NATURAL SIZE)

The Goshawk kills its prey by clutching, and driving its great talons into its victim's vitals, not releasing its hold until the quarry ceases to struggle (see Color Plate V and text, page 458).

These hawks are worked along hedgerows or in woods, only being used in open ground on hares, rabbits, or pheasants. In thick cover they perch hard by, watching for the instant the quarry may be put out by dogs or beaters.

The short-wings are very much more intent on their game than are the falcons, and even in a wild state have been known to chase fowls into the farmer's kitchen and kill there. Dr. Fisher records an amusing instance in which a goshawk dashed in and seized a fowl which had that instant been killed by a farmer, dragging it only a few rods before starting to deplume it. In another case, a hawk pursued its quarry through the kitchen of a farm-house into a bedroom and there made its kill under the bed!

While the strikes of this hawk are very hard and impetuous, they are usually short, and do not result in the exhaustion that follows a good flight by a falcon. Thus they may be flown many times in a day, and there is the record of old "Gaiety Gal," who was flown at 17 hares in one morning, trussing to all and killing clean all but the last, which, being exceptionally strong and the hawk naturally weary, got away after a struggle. Sir Henry Boynton's "Red Queen" killed 24 rabbits in one day.

There is something almost devilish about the fury of a goshawk's strike. Her yellow or orange eye, the pupil concentrated to a cold point, fairly burns with ferocity, and the clutch of her awful foot is such that virtually no amount of twisting or somersaulting on the part of the hare or rabbit can dislodge the great piercing hooks.

As an example of the goshawk's single-mindedness when in pursuit of quarry, Lascelles tells of one which drove impetuously downhill at a rabbit. As the quarry leaped four feet in the air to avoid the stroke which grazed it, the hawk turned over and caught it from underneath while in the air, "rolling afterward down a steep bank head over heels, but never leaving go her hold."

"It is not uncommon," continues this observer, "to see a rabbit captured at the mouth of a burrow, and hawk and all disappear under ground; but when she is lifted out, however much she is knocked about, the rabbit is in her foot."

THE SPARROWHAWK HAS MANY ADMIRERS

The sparrowhawk is reclaimed and trained in much the same manner as other hawks, and her tactics are almost exactly those of her big relative. No

whit less fierce and bloodthirsty is she, and the blackbird or starling that has put into a hedgerow or thicket has small chance of eluding the cold eye that is quietly watching from some near-by perch for the first stir.

The sparrowhawk has many enthusiastic supporters, and for many reasons is the best fitted for the amateur falconer, as these birds are not costly and small loss attends failure. They may be used on almost all small game and brush birds, and have been used with success on partridge. In England, however, the sparrowhawk is used chiefly on blackbirds and starlings, and while it is in a way small sport, the ingenuity of the quarry and the catlike agility of the little hawk give spice to the chase.

Here, even the tiny male or "muskett" is of use. The chase is over if the hawk makes a true strike; but the quarry is resourceful and nimble and it is frequently very difficult to make the pursued bird fly if it has once succeeded in reaching cover.

I once saw close at hand the tactics of a house-sparrow, which flew chattering within a few inches of my head, hotly pursued by a male sharp-shin, the American miniature of the sparrowhawk. The sparrow flew directly into the densest twiggy of an old lilac clump, and there continued to flutter and chatter. Almost instantly the hawk, wings and tail thrown back and lean, sharp talons extended, struck the bush with a thwack, trying to drive through to the terrified (but still resourceful) sparrow. Failing, the hawk, entirely ignoring me, turned back again

on its course, flew past me to a distance of perhaps a hundred feet, wheeled, and again drove at the bush as if thrown from a catapult.

This occurred four times in rapid succession before the hawk decided it was of no use and continued on its way philosophically. After a very short time the sparrow, too, resumed its normal state of mind and joined a group of others in the road near by.

From the foregoing it will be seen that falconry had its rise through man's early necessity, in man's birthplace, central Asia, where it has thrived almost without interruption ever since; that later it became the sport of the more privileged classes, attained a high pitch of popularity in medieval times, and has since fallen, as the result of many contributing causes, to a point where it is costly and extremely difficult to maintain.

It is not too much to suppose, however, that there will always be those who have the means and the desire to keep alive one of the most beautiful and romantic sports that man has ever devised. Fortunately, there is plenty of colorful literature on the subject from the days of chivalry and there are several practical books by later-day devotees of the art.

It is, perhaps, not too much to venture the belief that now, after the war that has so completely occupied the minds and lives of the civilized world is over, we shall swing back to some of the less serious pursuits that we formerly enjoyed, and that among these falconry may undergo a real revival.

AMERICAN BIRDS OF PREY—A REVIEW OF THEIR VALUE

IT IS not always easy to cast up an exact balance to show at a glance just what value we should attach to any given bird or animal, and the difficulty becomes much greater as the element of prejudice or chance personal observation complicates the verdict which dispassionate research determines for any given species.

The prejudice against all birds of prey is so general that it is well nigh impossible to convince any one who has once

seen a hawk steal a chicken that only a few kinds have this habit, and that all the rest deserve the most careful protection. This fact has been admirably set forth, however, in that now rare work, published in 1893 by the Bureau of Biological Survey, Dr. A. K. Fisher's "Hawks and Owls of the United States." Much of the specific information in the present article has been drawn from that authoritative source.

For many years the field agents of the

Biological Survey have been instructed to send to the Bureau the crops and stomachs of all the birds and animals they collect, that their food habits may be studied without favor or prejudice. As a result of this study, the balance in favor of the American birds of prey has been shown to be an overwhelming one. No similar natural check exists against the hordes of destructive and rapidly multiplying field-mice, gophers, wood-rats, ground-squirrels, and moles. Many persecuted species of birds feed their ravenous young almost exclusively on those pests of our grazing and grain regions, the grasshoppers, locusts, and mole-cricket.

It cannot be denied, nor is it my intention to palliate the charge, that certain hawks and owls are villainous destroyers of poultry, game, and beneficial birds. Let it be said here in parentheses, however, that man's own self-introduced pet, the cat, undoubtedly kills as many little chickens and vastly more beneficial and desirable birds than do all the birds of prey in America, many times over.

Virtually all the damage of which the opponents of our birds of prey complain is done by five kinds of hawk and one owl. The number of birds and fowls killed by the remaining eleven common hawks and five owls is so insignificant as to be comparatively of no importance.

The purpose of this study is not to cover in detail the whole performance of the entire list of American raptorial birds, and not more than two-thirds of the species are mentioned. Those that are so rare or that dwell in such remote or uninhabitable regions as seldom to fall under observation are omitted, as the family is, at best, a difficult one to describe or treat in a simple and lucid way. This is, of course, the reason for the present confusion in the minds of all except real students of ornithology. Still, the injustice and folly of persecuting a valuable family of birds for the misdeeds of less than a fourth of its number is so preposterous that another attempt to clear the situation is justifiable.

THE DESTRUCTIVE SPECIES (SEE COLOR
PLATE XVI)

Among hawks, the guilt for poultry, game, and bird slaughter practically falls on two rather small groups, most mem-

bers of both groups being among the comparatively rare hawks. The whole genus *Accipiter*, consisting of the Goshawk, Cooper's Hawk, and Sharp-shinned Hawk, are savage, bloodthirsty, and cold-hearted slaughterers, and are responsible in large measure for the anathema that is the portion of all hawks. Of these the Goshawk (*A. atricapillus*) is at once the largest and most destructive. It inhabits only the northern wooded portions of America, coming south in winter to a line extending from Virginia to central California, and farther south in the mountains.

This intrepid bird has frequently been known to chase a fowl into a farm-house and make its kill in an inner room (see page 459). It is a forest hawk and is seldom seen far from the cover of woods. It feeds on birds in preference to all other food, with rabbits as second choice. On northern game preserves it is coming to be a grave nuisance and has seriously menaced the small remaining numbers of Heath hens on Marthas Vineyard. Its rarity over most of the country is its one redeeming feature, unless we can admire its intrepid courage and its great beauty, ignoring its destructiveness.

The Cooper's Hawk (*A. cooperi*) is the most important species as a destroyer of game and poultry. It is a common species everywhere in North America, living in the woods, whence it makes short, swift sallies, returning immediately with its prey. It is seldom apprehended at work and is known chiefly by its accomplished depredations. It is a bold, cunning, and destructive hawk, and is, more than any other species, responsible for the work which has given all hawks a bad name. While most of its daily kill is among the birds of the forest, it is a serious nuisance on the farm, taking toll of young chickens, ducks, and pigeons, but being hardly powerful enough to tackle successfully the grown birds.

This hawk can usually be told by its flight, which is accomplished by three or four sharp flaps and a short sail, repeated as long as it is in sight. When it soars, its circles are small, and the long tail and rounded wings give it a totally different appearance from the "soaring hawks" of the red-tail and red-shoulder type. It is almost the exact counterpart



Photograph from Louis Agassiz Fuertes

THE SHRIKE ON HIS LOOKOUT

His business is to espy the passing falcon afar, and by his excitement and clamor to inform the trapper of the hawk's approach (see text, page 435).

of the smaller Sharpshin, whose habits are equally destructive, but the quarry is smaller, in keeping with the size of the bird.

THE BIRD-KILLING FALCONS ARE NOT COMMON

The long-winged true falcons, which include the Duck Hawk or Peregrine, Prairie Falcon, and Pigeon Hawk, as well as the powerful Gerfalcons of the far north, are all great bird-killers, and it is fortunate that they are nowhere common. These splendid birds all kill on the wing, ignoring sitting prey, and while we must admire the skill, speed, and grace with

which they strike and the nobility of their courage, it is true that they do much damage on game covers and preserves, appearing in numbers when game becomes abundant.

The Gerfalcons are too rare to be economically important, but the Duck Hawk is found in small numbers all over America and must be considered an undesirable bird. It can take care of itself, however, rarely falling to the gun and avoiding traps with uncanny skill.

In the more arid portions and in the mountains of the West the pale-brown Prairie Falcon is not rare. This species is less partial to water and feeds exten-



Photograph by Howard H. Cleaves

A RED-SHOULDERED HAWK PHOTOGRAPHED AT THE MOMENT OF ITS STRIKE

Note the phenomenal reach of leg of this bird of prey, a species widely distributed and commonly known as the "Henhawk." The name does it an injustice, for it deserves to be encouraged and protected as an enemy of rodents and destructive insects.

sively on desert quail, jays, and other birds of its inhospitable habitat.

The Pigeon Hawk is really much like a tiny peregrine. It can catch the fleet and elusive sandpipers and plover along shore and is usually encountered following the migrating flocks in spring and fall. This little falcon varies its diet and improves its record by consuming large numbers of crickets, grasshoppers and beetles, but it is a willing and capable ogre when song birds abound, and one seldom comes to hand that has not plenty of evidence against it in its crop.

Among the owls, the Great Horned, or "Cat Owl," does practically all the damage for the family. Big, powerful, aggressive, and fearless, he finds no difficulty in helping himself to the farmer's poultry whenever he feels like it, when allowed to roost outside. A muskrat trap, set baited or bare on a convenient perch near the chicken yard, is a cruel but practical way of determining who has been thieving, though sometimes a Barred Owl, rattling around the barns, falls victim to this method.

These, then, are the real culprits, if placed on a profit-and-loss basis. The

beneficial species outnumbers those on the "black list."

THE BENEFICIAL SPECIES (SEE COLOR PLATE XV)

By far the most important group of rodent-killing birds is the very group to which we have mistakenly given the common name of "Henhawk" and "Chicken Hawk," a most unfortunate error and one most difficult to undo.

It may be stated broadly that the big, conspicuous hawks we see sitting, eagle-like, on tall snags above the green of the woods, or in exposed positions from which to view a large area, or sailing in broad, majestic circles high in the summer sky, are not the ones we may blame for our losses, but *are* the ones we have to thank for holding in check the vast and all-but-overwhelming army of field-mice and other destructive mammals which keep agriculture near to the unprofitable point. These pests are difficult and very expensive to fight by artificial means, and the soaring hawks are their one great and efficient enemy.

Next come all the owls except the Great Horned, which, indeed, must have



From a painting by Louis Agassiz Fuertes

OF THE SEVEN OWLS ORDINARILY ENCOUNTERED IN THE UNITED STATES, THE ONLY ONE THAT DOES MORE HARM THAN GOOD IS THE GREAT HORNED

While most of the others occasionally kill a bird, they are, as a family, decidedly helpful to man, killing vast quantities of mice, rats, gophers, and squirrels. They see by day just as well as other birds.

some credit, as he, too, kills his full share, but in addition to a diet of valuable prey.

Of the *Buteos*, or "Soaring Hawks," the big Red-tail is the commonest and most widely diffused, and consequently the most important. Almost universally dubbed "Henhawk," this valuable species is universally persecuted and shot on sight.

Let us take the summary of Dr. Fisher's examinations of 562 stomachs of Red-tails from all over the United States. Of these, 89 were empty, leaving 473 which carried evidence. Of these, 54 contained poultry or game, 278 contained mice, 131 other mammals (28 species of destructive mammals), 37 batrachians or reptiles, 47 insects, 8 crabs, and 13 offal.

If a Red-tail is caught in the act of killing poultry it should be shot, as it "has the habit." The above record shows plainly, however, that the preponderance of evidence is vastly in favor of the species, whose size and appetite make it a most effective and valuable ally of the farmer in his fight against the mice and rats that menace his labors.

All over the West another large and conspicuous hawk is found, which is a great killer of vermin, particularly of small rodents. This is Swainson's Hawk, whose record is absolutely clean, its whole food being divided about equally between small mammals and insects.

THE RED-SHOULDER SHOULD BE ENCOURAGED

Another very common and widely distributed "Henhawk" is the Red-shoulder. This bird has an even better record than the Red-tails. Some 200 examined revealed only 3 which had eaten poultry, 12 small birds, 142 mice and other mammals, 92 insects, and a number with miscellaneous food.

Mr. Alden Loring, who watched a pair of this species that nested near a poultry farm, says: "The pair reared their young for two years about 50 rods from a poultry farm containing 800 young chickens and 400 ducks, and the keeper told me he had never seen the hawks attempt to catch one." This hawk deserves to be encouraged to the utmost, and both it and the Red-tail should be relieved of the false title by which they are so generally known and designated, either by their

proper names or as "Mousehawk," and accordingly treated.

The Broad-wing, the small member of this group, does not often fall into the hands of farmers and gunners, as it is a forest hawk that seldom leaves the shade and shelter of the woods. Its particular claim to man's protection lies in its partiality to the large, fat caterpillars of the big *Cecropia*, *Polyphemus*, and similar large moths that defoliate the forest trees. It also, of course, consumes quantities of field-mice, voles, and shrews, and small snakes are favorite food.

The two Rough-legs feed almost exclusively on mice. The eastern Rough-leg comes to the northern States only in winter, and is not common enough to be of much economic importance. Of 45 stomachs of this species containing food, 40 contained field-mice and 5 other small mammals.

Over all western America the Ferruginous Rough-leg, or "Squirrel Hawk," is a fairly common and very important species.

With the utilization of large areas through irrigation, the ground-squirrels of the *Citellus* group have multiplied enormously, and not only cost the region millions of dollars in the grain and produce consumed, but do untold damage by burrowing in the irrigation dikes, causing floods to pour over the land at times when they are fatal to crops. By far the most effective enemy of these pestiferous rodents is the Red Rough-leg, or "Squirrel Hawk," and, as with the less desirable species, it has responded to the abundance of food, and has within comparatively few years become the principal check upon the greatly increased numbers of destructive ground-squirrels.

THE OSPREY, OUR LARGEST HAWK

The Osprey, or Fishhawk, as its name implies, feeds exclusively upon fish. It is our largest hawk, being almost as impressive on the wing as the Eagle himself. Its food consists almost wholly of the sluggish fish, such as carp and suckers, and it is in no sense a competitor of the angler or the commercial fisherman. It is our most picturesque bird of prey and should by all means enjoy perfect immunity and protection.

England, now almost without Ospreys,



© Howard H. Cleaves

AN OSPREY, OUR LARGEST HAWK, RISING FROM A STRIKE

This is America's most picturesque bird of prey, and on the wing is almost as impressive in appearance as the eagle. Feeding exclusively on fish, the bird checks itself directly over its quarry when sighted. With wings folded and talons wide open, it descends, sometimes burying itself in the water with the force of its impact. In the above photograph the hawk is seen rising from the water after striking a decoy fish anchored to a stone.

would give much to rehabilitate this beautiful creature if it could do so. But let us realize that it is virtually impossible to reestablish any species when it has once become locally extinct.

And here let us take heed in the case of another fine species, one with every patriotic and sentimental reason for its most sedulous protection—the White-headed, or "American," Eagle. For the past year this noble species has been placed upon the black list in Alaska and, far from being protected, a bounty of 50 cents a head has been placed upon it. This had resulted, up to January, 1920, in the killing of some 5,000 eagles in Alaska.

It is charged that eagles interfere with the salmon fisheries and kill large numbers of young deer, sheep, and goats, and on this plea one of our most beautiful and interesting species is threatened with early extermination in the one region where it is, or was until recently, suffi-

ciently common to give a thrill to the visitor. It would seem that the mere fact that it is the universally recognized emblem of our nation should give this fine species protection wherever it is found in America, and that no local interest, until thoroughly substantiated by expert Federal investigation, should withdraw it from the safety of complete Federal protection.

The Marsh Hawk has not quite so clean a record of achievement as have most of the foregoing, as out of 115 stomachs 41 contained bird remains, of which 7 were game or poultry; 79 contained small mammals, the preponderance of which were meadow-mice. Thus, while it is mainly beneficial, it does kill quite a proportion of feathered food.

Last, but very important, comes the common little Sparrowhawk. As small as the smallest, his abundance and wide distribution make it necessary to reckon with him. The American Sparrowhawk

is a little falcon, related to the Kestrel of Europe, but, unlike the European Sparrowhawk, an inveterate bird-killer, related to our Sharpshin. Our little falcon, the most ornate and beautiful of American hawks, is of invaluable service to agriculture by virtue of his fondness for grasshoppers. Occasionally he catches a bird; about a third of his diet is mice, but far the largest part is insects. During June, July, and August, when the young are being raised, they are fed over their weight daily on grasshoppers.

The service rendered by owls is even less appreciated than that of hawks, because they are mostly nocturnal, and hence are seldom heard and almost never seen. Owls are quite as expert mousers and ratters as the diurnal birds of prey, and the Great Horned is the only one which deserves a consistently bad reputation.

The Barred Owl lives almost exclusively on field and white-footed mice, with chipmunks, squirrels, rabbits, crawfish, and insects to vary the menu.

The Barn Owl, common all over the warmer parts of America, is exclusively a rodent feeder, and is 100 per cent beneficial, while both the long-eared and short-eared species are in virtually the same category, the Long-ear foraging in and around the margins of wooded areas and the Short-ear frequenting the wet meadows and marshes for voles, shrews, and mice.

Everywhere the commonest of all, the little Screech Owl, is the bird that most people hear and recognize. His soft, quavering call and velvety tooting are familiar and welcome sounds to those who know him, for he is the one owl that can and does survive with the taming of the land. Indeed, he seems to thrive best in the more thickly settled farming regions, nesting in the "woodlot" or orchard, in the village parks, or in the more wooded estates in the suburbs of large cities.

No bird of prey has a more varied list of food than this smallest of our common owls, as the following summary will show: Of 212 stomachs examined, 39 contained feathers, 112 small mammals, 100 insects, 2 lizards, 4 batrachians, 1 fish, 5 spiders, 9 crawfish, 2 scorpions, 2 earthworms, and 7 "miscellaneous."

The beautiful Snowy Owl, which comes in winter to the northern portions of the United States, has in some curious manner had protection specifically withdrawn from it and stands on the list of unprotected "vermin" on the game laws of the land. Out of 26 evidence-bearing examinations, 20 revealed injurious mammals and 11 had feathers among their contents. This is surely in favor of the Snowy Owl, which in winter is frequently seen along the seashore or on the ice-edge on the Great Lakes.

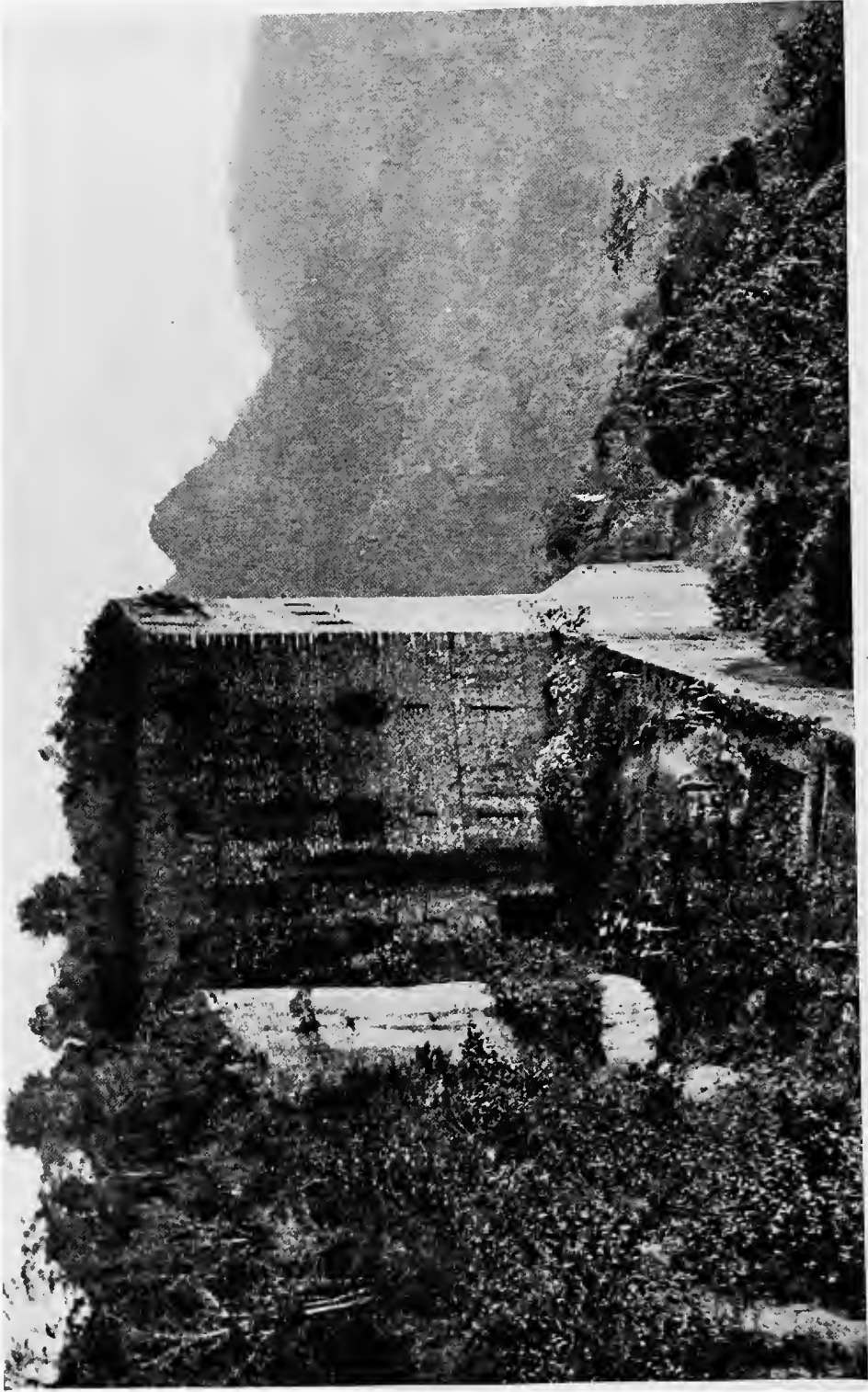
A PLEA FOR THE FARMER'S AIR SCOUTS

Is there not some direct way to bring before the agricultural and economic forces of our land their true relation to our birds of prey?

It is surely short-sighted voluntarily to destroy the greatest natural check on the greatest natural enemies of our greatest natural resource, and it would seem that merely proving the point that the birds of prey do even a little more good than harm would be sufficient to insure them complete protection. But it is easy to show that they are, all in all, of very vast value to our rural interests, and that their beneficial offices would be multiplied exactly in proportion to their increase under adequate protection.

It is largely our conservatism, the unwillingness to give up an idea that has long had lodgment in our minds, combined with the apparently complicated problem of "which is which," that has made the valuable species suffer from the misdeeds of the noxious ones, until now the situation is in many places really critical.

The time is not far away when one of two things must happen: Either proper and adequate protection must be granted and *enforced*, covering all birds of prey except the Goshawk, Cooper's Hawk, Sharp-shinned Hawk, Pigeon Hawk, Duck Hawk, and Great Horned Owl, the whole country over, or we shall soon find it too late to avail ourselves of their inestimable services, and must find new, costly, and far less efficient means of protecting our rural interests from the hordes of rapidly multiplying enemies that will continue, in ever-increasing numbers, to wage war upon agriculture.



THE MAIN ENTRANCE TO CHRISTOPHE'S CITADEL; HAITI

There are only two entrances to the citadel. One was used to bring in cannon balls from the reserve supplies stored on the terraces, and the second admitted to the prow of the fort. Massive, loopholed wooden doors guarded both entrances. Note the height of the towering walls compared with the men standing on the terrace.

THE EAGLE, KING OF BIRDS, AND HIS KIN

BY ALEXANDER WETMORE

ASSISTANT SECRETARY, SMITHSONIAN INSTITUTION

With Paintings from Life by Maj. Allan Brooks

THE GEOGRAPHIC presents in this issue the fifth of a series of paintings descriptive of all important families of birds of North America. The first (*Humming Birds, Swifts, and Goatsuckers*) appeared in July, 1932; the second (*Ibises, Herons, and Flamingos*) in October, 1932; the third (*Crows, Magpies, and Jays*) in January, 1933, and the fourth (*Woodpeckers*) in April, 1933. The sixth of this series will be published in an early number of the NATIONAL GEOGRAPHIC MAGAZINE.—EDITOR.

THE eagle, symbol of bold strength and courageous character, has been used so widely as an emblem of power that, by name and by effigy, birds of the group to which it belongs are known familiarly to many who have little experience or conception of them in life.

Eagles and their many relatives among the hawks and vultures are distributed throughout the world, except over the open seas, the barren Antarctic Continent, and the smallest and most isolated of oceanic islands. Wherever found, they appeal even to the novice in knowledge of things outdoors because of their manner of life and predatory habits. Robust of form and strong in flight, they are remarked at every appearance.

The emblem of the Sumerian city of Lagash, in the third millennium before the Christian Era, was an eagle, which was engraved on the tablets and seals of the leaders and was carried as a military standard by the army. An eagle also appeared on the seal of the King of Ur, and continued in double-headed form in Hittite art, on certain coins of the Mohammedans, on the flags of Turkoman princes, and so on into modern times.

The eagle symbol is probably derived from forms similar to our golden eagle or closely allied to that species, as several species of that type are found in the regions mentioned.

To early Greeks the eagle was the messenger of Zeus and the only bird that dwelt in heaven—a fancy based, perhaps, on the high-flying powers of these birds. A silver eagle standing on a spear was placed on the military standards of the legions of Rome, and this emblem has been used widely as a conventional badge of military power. To-day it is a common decoration on flagstaffs in many countries.

An American species of this group, the bald eagle, is found in the design of the coat of arms of the United States, which appears on the Great Seal. A representation of it is blazoned on many of our coins and decorations. It also appears on the President's flag, and on the President's seal in the bronze plate on the floor of the vestibule of the White House.

The fierce harpy eagle (*Harpia harpyja*), a bird of dauntless courage, called by the Aztecs "the winged wolf," is engraved on the official coat of arms and seal of Mexico and appears on the flag of that country. It is distinguishable from our species by its prominently crested head.

CONDOR APPEARS ON COATS OF ARMS

The great condor of South America figures in the coats of arms of Colombia, Bolivia, Ecuador, and Chile.

The eagles and their kin form the group of birds of the order Falconiformes, which includes about 288 distinct species, with many additional geographic races, so that in all there are recognized somewhat more than 700 living forms. The order is divided into four principal families.

The eagles, hawks, kites, and their relatives, forming the family Accipitridae (Plates III through XIII), include the largest number of forms. They are mainly birds of medium to large size, with broad wings, strong legs, feet armed with sharp claws, and strongly hooked bills. Many possess light-colored eyes, which, with their active interest in any movement that might indicate possible prey, give them a fierce and aggressive appearance.

Although many have rapid flight, others are slower and more sluggish in habit. Most of them delight in soaring in great



Photograph by David T. Griggs

YOUNG EAGLES TAKE OFF FROM THEIR NEST IN ALASKA

In three years these birds will perfect their plumage and they may live to be centenarians. Eagles are not popular with Alaska fishermen, for they take heavy toll of the salmon going up streams to spawn.

circles high above the earth, where they are conspicuous and are visible for long distances. Some of the species of this family are among the largest of flying birds.

FALCONS CAPABLE OF SWIFT FLIGHT

The falcons, with their relatives the caracaras, the family Falconidae (Plates XIV, XV, XVI), in general are smaller in size than the members of the other group of hawks, and have longer, more pointed wings, which give them swifter flight that may be maintained at high speed for long distances.

Though some, such as the chimangos, or carrion hawks, and the caracaras, may be in part carrion feeders, the majority, the true falcons, are fiercely predatory hunters, in the true sense of the word, whose appearance strikes terror among other birds. The bill of the falcons, sharply pointed at the tip, has a projecting tooth on the margin that is of assistance in tearing their food.

The New World vultures, family Cathartidae (Plates I and II), although

hawklike in form of body and spread of wings, have relatively weak legs and feet which are not used to seize or carry prey. Their beaks, though strong, are not prominently hooked, and except for their flying muscles these birds are far less powerful than their relatives.

These are the scavengers among birds, for whom no food is too repulsive, that spend their days in scanning the surface of the earth for dead creatures on which they may feast. They are confined to the Americas, the carrion-eating vultures of other lands belonging to the Accipitridae.

The secretary bird, the only living species in the fourth family, Sagittariidae, one of the most remarkable birds of the entire order, stands nearly four feet high, having long, slender legs like those of a heron. Though it has strong wings, it ordinarily runs on the ground, traveling at need with great swiftness. It is found only in Africa, from the Anglo-Egyptian Sudan and Senegambia to Cape of Good Hope Province. It feeds on snakes, lizards, and various other animals, often killing them by stamping on them with its feet.



Photograph by William L. Finley

A FULL-GROWN CALIFORNIA CONDOR ENJOYS A SUN BATH

He differs from the South American members in dress, but not appreciably in size. His head and neck are much more colorful and there is no caruncle. The tremendous wing spread here shown gives this bird marvelous powers of flight.

The most aberrant types in the entire order are the American vultures, which are far removed from the hawks and eagles and in some ways have peculiarities that set them off from most other birds.

Aside from the peculiar types just mentioned, the various species of this order are fairly uniform in build and form, differing principally in length of legs, grasping power of claws, and size and degree of robustness of bill. Thus, the bill of the eagle is strong and heavy, but that of the everglade kite is extremely slender and elongated.

The bateleur eagle (*Terathopius ecaudatus*) has the tail so short that it does not project beyond the wings—an anomaly in a group that as a whole has long, strong tail feathers. In spite of this peculiarity, the bateleur sails with ease, using its wings as planes, though it is said to have difficulty in keeping aloft when there are no wind or air currents to assist it.

One of the striking phenomena of some of our American hawks has been the fall migrations, in which hundreds, or even thousands, move together in southward

flight. Years ago, in eastern Kansas, in the pleasant weather of October, it was usual to encounter flights of red-tailed and American rough-legged hawks, in which these splendid birds drifted steadily across the sky for hours in never-ending procession. Occasionally, attracted by rising currents of air over some hill slope, they paused to wheel in enormous spirals.

MIGRATION OF SOME HAWKS SPECTACULAR

Often I lay on soft grass, in the warm sun, watching several hundred of these hawks turning slowly through the sky, some at such an elevation that they looked no larger than swallows. On occasion I have seen similar flights of the Swainson's hawk of the western Plains, these birds traveling in bands on migrations that carry them far into South America.

The migration flights of the sharp-shinned and Cooper's hawks in the East are better known, though they are seen only in favored localities. Point Pelee, which projects as a long peninsula from the Canadian shore of Lake Erie, for many years has been famous for its hawk



Photograph from C. M. Wagner and W. Boesser

NEW JERSEY OSPREYS MADE WISE CHOICE OF HOME SITE

From their nest in an old telephone pole in Middlesex County the birds have a clear and unobstructed view of the surrounding country and easily may detect the approach of an enemy.

flights. In October, 1931, in the course of a few hours, I saw there several hundred sharp-shins drifting down with the north wind, alternately flapping their wings and sailing with pinions outstretched, passing without pause out over the waters of the lake toward the distant American shore.

While there were never many in sight at one time, they passed at intervals of two or three minutes in a steadily moving stream. Elsewhere in the fall I have observed Cooper's and sharp-shinned hawks scattered over the entire sky, moving steadily toward the south. These flights of hawks are most marked in fall, for

in spring the birds seem to travel northward over wider areas.

At a number of places it is regular practice to shoot these birds for sport, and many thousands have been killed in this manner. Occasionally, as near Cape May, New Jersey, they are used for food.

The different species of the hawk group vary widely in the extent of their migrations. Some, such as Swainson's hawk, make journeys that carry them from the western Plains south into Argentina, while others, such as the sparrow hawk, may be quite sedentary except in the northern sections of their range.

In general, birds of this group withdraw at least in part from the extreme northern areas that they inhabit, probably because food becomes scarce and difficult to obtain. The gyrfalcons, however, are typically northern, never coming far

south, and rough-legged and allied hawks course over the northern plains in the greatest extremes of cold weather.

FLIGHT METHODS VARY

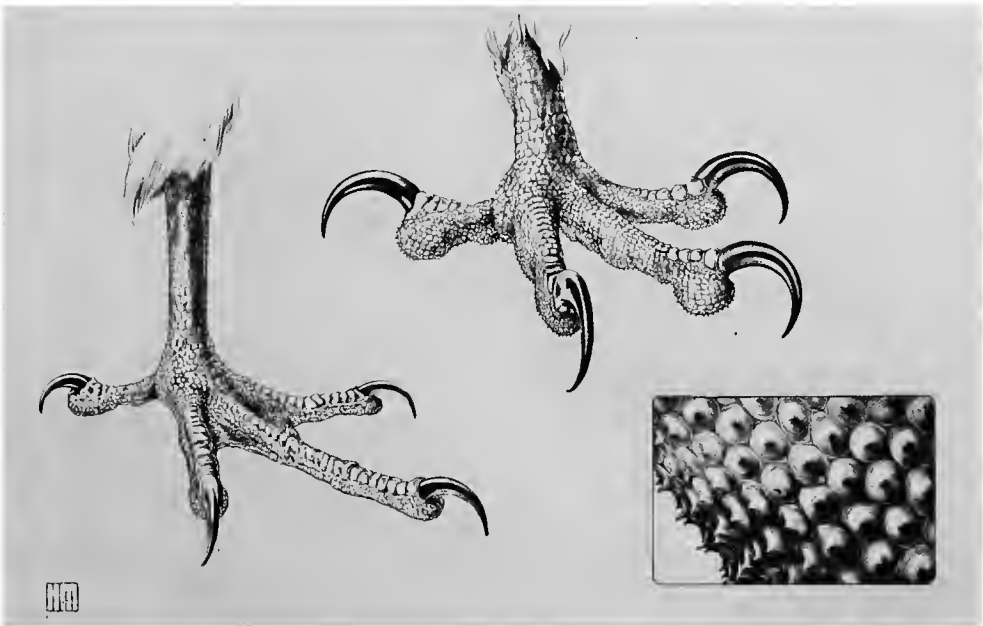
Flight in the hawklike birds varies considerably, according to the kind. Eagles, the large hawks, and the vultures, both of the New and Old Worlds, have broad wings which they flap slowly. Frequently they soar with set wings, utilizing air currents rising from the heated surface of the earth, or currents generated by winds. These birds frequently soar for hours with scarcely a wing beat, turning and wheeling in the sky, often at such



© Wright M. Pierce

COASTING HOME

The American osprey is a strong and graceful flyer. When about to land at the nest he sets his wings and coasts in (see "The Nest Life of the Osprey," by Capt. C. W. R. Knight, in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1932).



Drawing by Hashime Murayama

TWO TYPES OF FEET FOUND IN THE HAWKLIKE BIRDS

The foot of the osprey, at right, illustrates the development for grasping and holding, characteristic of the predatory forms of falcons and hawks. The foot of the turkey vulture, at left, is a weaker type, fitted for walking and perching and not for seizing living prey. The inset shows an enlarged view, magnified four times, of the spines on the foot pads of the osprey, which enable it to hold slippery fish, an arrangement found only in this species.



© Press Cliche

TRIBESMEN OF RUSSIAN CENTRAL ASIA SET OFF FOR A DAY'S SPORT WITH THEIR HUNTING EAGLES



Photograph by Capt. Collingwood Ingram

A REMINDER OF THE DAYS WHEN HAWKING WAS THE SPORT OF KINGS

Very few practice the sport now, but in medieval days it was an aristocratic pastime, with more than one royal devotee. The falcon has just dispatched its quarry on Salisbury Plain, England.

altitudes that they appear as mere specks against the blue

The turkey vulture is a well-known species that is particularly adept in this art. In fact, it finds this method of progression so adapted to its needs that frequently it remains in its roost through the day when the air is heavy and still.

The falcons have longer, more pointed wings, that enable them to fly with great speed, and, though they may enjoy soaring, they do not practice this so constantly as the other hawks. The larger species can capture the swiftest-flying sandpipers and ducks on the wing without the slightest difficulty.

THE DUCK HAWK IS A DESPOT OF THE AIR

The flight of the duck hawk, perhaps the best known of the falcons, is truly exhilarating to watch, as it is executed with a dash and vigor that mark it from that of all other birds.

On the Bear River marshes, at the northern end of Great Salt Lake, in Utah, I have spent many hours in observing this falcon, both in its hunting and when at play.

The birds at rest perched in low willows, or on logs or bits of drift, where they had clear view of the teeming bird life about them. When hungry, they dashed across the open flats at high speed, striking ruthlessly at any birds that appeared, from small sandpipers to large ducks.

Their appearance in the air was always the signal for chattering cries of alarm from blackbirds and avocets that put all



Photograph by W. I. Finley and H. T. Bohlman
ALMOST READY TO LEAVE HOME

This young golden eagle is about ready to fare forth from the eyrie, which has been his home for two months, and start learning how to make a living for himself out in the world. His parents are stern but effective teachers, and when they finally drive him away he will be well versed in the lore of the wild.

their bird neighbors on the watch. These warnings had little effect, however, as the duck hawk, killing practically at will, was truly despot of this realm.

I have seen this falcon dash through closely massed flocks of flying sandpipers, striking out two or three with as many thrusts of the claws, allowing each bird to drop and then wheeling swiftly to seize the falling prey in mid-air before it reached the ground. Again, I have seen one in a stoop, swift almost as light, knock a redhead duck to the ground, where it landed with a broken wing and other injuries.



Photograph by Dr. A. A. Allen

SWALLOW-TAILED KITES SOAR AND CIRCLE ALOFT WITH BUOYANT GRACE

So well provided with wing and tail surface are these larger prototypes of the barn swallows that they spend nearly all of their time in the air. They even feed in the air, often on small water snakes, which they deftly snatch from among the reeds and devour aloft.

On one occasion a pair of duck hawks harried a helpless nighthawk, stooping at it playfully until one in passing gave it a quick squeeze with one foot. It then allowed the nighthawk to fall, when it was seized by the other duck hawk. Then the pair flew away, and the one with the booty at intervals dropped it, so that it could be seized in air by its mate.

THE DUCK HAWK A PRACTICAL JOKER

When not hungry, the duck hawk, feeling its superior strength, frequently indulges in harmless play at the expense of its bird neighbors.

Often I have seen them flying along the river channels, driving ahead of them a motley flock of blackbirds, herons, avocets, and other birds, herding them in disorder like sheep, but without offering to harm them. Again, as night herons flew ahead of my launch, a duck hawk would dart at them repeatedly, forcing them down lower and lower, until finally, with protesting squawks, they struck the water. They were not allowed to rise, but had to swim into the shelter of the willows to escape.

One pleasant afternoon in fall I heard a great roaring of wings overhead and looked up to see a cormorant that a few minutes before had been soaring peacefully high in air, dashing down with set wings toward the river, with a duck hawk a few feet behind. Just above the water the hawk suddenly accelerated, tapped the cormorant lightly on the back, then circled easily away, while the frightened quarry took refuge unharmed in the water. Frequently falcons at play dashed at top speed through milling flocks of flying sandpipers, scattering them like leaves in the wind, but not striking any of them.

The food of birds of the hawk group is highly varied, though it is taken entirely from the animal kingdom. The larger species of falcons subsist mainly on various kinds of birds and small mammals, but the smaller kinds, such as sparrow hawks and falconets, eat lizards, grasshoppers and other insects, and mice. The common red-tailed hawks and their allies, known universally as "chicken hawks," may on occasion eat birds or even visit hen-yards for prey, but confine their attention prin-



Photograph by Dr. A. A. Allen

LOOKING OUT ON THE WORLD FROM A MOSSY NEST

Mr. and Mrs. Kite, of the swallow-tailed kites, built their home in the top of a tall tree near a watercourse. Dry twigs, sticks, hay, and moss were used. The birds of this family breed over a wide range of territory and incubation may start any time from March to June.

cipally to mice and rats. Therefore, they are in the main beneficial, as they destroy large numbers of rodents that are injurious to crops and orchards.

VULTURES AS "BONE-BREAKERS"

The bearded vultures of the Old World are said to carry turtles and large bones from the carcasses of dead animals to a great height, in order to drop them on rocks, where they break open so that the bird can eat the marrow. From this habit the Spanish call these birds *quebrantahuesos*, signifying "bone-breakers." The ancient naturalist Pliny relates that the Greek poet Æschylus (who died 456 B. C.) met untimely death when one of these vultures, mistaking his bald head for a stone, dropped a tortoise on it from the air!

Some species of hawks, particularly certain forms that range in the Tropics, eat snakes as their principal food. There is one group of species found in India and adjacent regions in which this habit is so constant that the birds are known as "serpent eagles." The osprey and some of the

sea eagles confine their attention mainly to fish, which they capture alive by plunging after them as they approach the surface of the water.

As their name implies, the peculiar bat-eating hawks (*Machaerhamphus alcinus*) from the East Indies and Africa feed on bats. Since these hawks capture their prey on the wing, they are abroad in the evening and early morning, being at least partly nocturnal in habit. The honey buzzards of the Old World (*Pernis*) are fond of honey and of the immature stages of bees.

Swainson's hawk, a bird of large size, feeds extensively on grasshoppers, the broad-winged hawk is fond of frogs, the everglade kite subsists on large fresh-water snails, and the powerful harpy eagle feeds regularly on monkeys.

Possibly the strangest food in the group is the repulsive carrion eaten by the vultures. These birds spend the daylight hours soaring in the air, while they scan the earth below them in search of dead animals that may supply food. Small animals, dead fish, and birds are bolted entire or are torn into suitable fragments. The



Photograph by American Colony, Jerusalem
A BEDOUIN OF TRANS-JORDAN WITH HIS HUNTING FALCON

skin on large carcasses may resist the bills of the scavengers until softened by putrefaction, when the birds gorge on a meal of the utmost repulsiveness (see page 56).

While we may turn in physical revulsion from contemplation of this habit, we may ponder on the adaptations that seemingly give these birds absolute immunity to the poisons, generated in decaying flesh, that would destroy any creature of ordinary digestion.

The bird-eating hawks pluck most of the feathers from their prey and then tear the flesh into bits that may be swallowed. Mice are often swallowed whole, but rabbits and mammals of similar size may be partly skinned and the feet may be discarded.

The food passes down into a stomach that is thin-walled and capable of considerable distention, and in the throat there is developed a distensible crop that holds a large amount of food until the stomach is ready to receive it.

Bones, feathers, fur, and other hard elements that cannot be digested are formed into pellets and regurgitated to leave the stomach empty for another meal. These pellets accumulate beneath favored perches and offer a valuable index to the food preferences of these birds. Hawks, falcons, and eagles carry food in their talons to their young in the nest, but vultures, which do not have powerful feet and legs, feed their young by regurgitating the contents of the stomach.

Whether the carrion-feeding vultures locate the carcasses on which they feed through sight or through the sense of smell has been a subject of much controversy among naturalists, and, in spite of many observations on these abundant birds, it is far from being a settled question.

VULTURES POSSESS KEEN SIGHT

One group of observers contends that, as these birds soar back and forth through rising currents of air or against the wind, sometimes at high and sometimes at low elevations, they encounter the odor from carrion and follow this scent to its source. Others believe that in their flight the piercing eyesight of these birds brings to view possible sources of sustenance, and that vision accounts for the facility with which vultures locate their food.



AFter FIVE WEEKS IN THE NEST, YOUNG DUCK HAWKS TEST THEIR WINGS

As soon as feathers began to develop, the young birds flapped their wings vigorously, often tipping themselves over in the process and sending bits of down flying in all directions. This nest is near Hanover, New Hampshire.



Photographs by C. A. Proctor and B. B. Leavitt

STANDING GUARD NEAR HIS NEST

Duck hawks are strong and courageous, and this one, having just alighted on the nesting shelf, seems to be challenging anyone or anything to try conclusions with him. The duck hawks are the nearest American relatives of the peregrine falcons, famous hunters of the Old World.



Photograph by George Shiras, 3d

A DUCK HAWK FINDS HIS PREY A WOODEN DECOY: SANDUSKY BAY, OHIO

The hunting method usually pursued by these birds is to rise in spirals until directly above the victim, and then to drop swiftly upon it. However, they are fast flyers and are capable of catching other birds in direct chase.



Photograph by C. A. Proctor and B. B. Leavitt

LUNCH TIME IN A DUCK-HAWK NEST NEAR HANOVER, NEW HAMPSHIRE

The fifteen-day-old youngsters have been expressing their appetites vocally and their complaints are at last producing results. The menu consisted entirely of birds, and, when the victim was small, only wing and tail feathers were wasted. A small bird's claw may be seen projecting from the bill of one of the chicks.



Photograph by Dr. A. A. Allen

A PAIR OF DUCK HAWKS HAVE CHOSEN FOR THEIR NESTING PLACE A HIGH AND SECLUDED LEDGE NEAR TAUGHANNOCK FALLS, NEW YORK STATE

The eggs were laid on the shelf of rock in the lower left foreground, where the young birds may be seen. One of their parents keeps a watchful eye out to see that no danger threatens them. The falls are 215 feet high, which is higher than Niagara Falls.

In warm weather, proponents of the scent theory have concealed bodies of animals so that they could not be seen, and claim that in a short time, as the carcasses became odoriferous, turkey vultures gathered. Even though the carrion was so concealed in buildings or under other cover that the birds could not get at it, they remained on hand, attracted by the odors, in the attempt to locate this potential food supply. Experiments dealing with this matter began in the days of Audubon and have been continued by other naturalists until the present day.

There is not the slightest question but that the turkey vulture will find food that is concealed in such a way as to be en-

tirely invisible to a bird overhead, even though such a bird may be only a few feet distant. However, in most alleged instances of location by scent, keen sight has probably played some part.

That the turkey vulture is an observant creature, with keen perception where food is concerned, is obvious if one watches it a little, though there may be doubt as to the extent of its intelligence in other respects. These birds regularly patrol beaches to obtain dead fish, and recently have learned to watch the modern hard-surfaced roads, where speeding automobiles are constantly killing small birds, snakes, rabbits, cats, and other animals.

Also, they seem to know that the



Photograph by Alice Schalek

UNOFFICIAL HEALTH OFFICERS KEEP THE BEACH CLEAN AT SANTOS, BRAZIL

These carrion-eating vultures dispose of carcasses quickly and efficiently and the law forbids anyone to shoot them. The picture shows a group of the birds at their highly essential work.

movements of men through the country will bear scrutiny, as frequently men leave behind them food in the form of animals killed, or offal from large bodies that have been butchered.

To test this, it is necessary only to sit on the open ground while skinning a rabbit or some large bird, and if you are in a region where turkey buzzards are common, it will be only a few moments until one or two are wheeling overhead. If there is promise of food, they remain; if not, they continue their search elsewhere.

In South America yellow-headed buzzards (*Cathartes urubitinga*) have followed me into woodland where I was seated on the ground entirely concealed and engaged in examining birds that I had killed for specimens. The buzzards alighted a few feet away to watch me curiously. I have had buzzards come to eat the flesh from carcasses of their own kind which I had skinned where I had shot the birds. Possibly this was unintentional cannibalism, as there was nothing about the bodies to distinguish them from the skinned bodies of any other birds.

There can be no doubt that the buzzard has learned to watch the actions of dogs whose activities may indicate the presence of carrion concealed in caves or holes. There is also the probability that the presence of buzzing flesh flies that breed in carrion may be an indication to the buzzard of a concealed food supply. Therefore, admitting that the turkey buzzard has a well-developed olfactory nerve, and thus might be expected to have some sense of smell, to me present evidence indicates that it finds its food mainly, if not entirely, through its acute sense of sight.

MAN'S HAND IS AGAINST THE HAWK TRIBE

The hand of civilized man has been raised universally against the hawk tribe, and birds of this group are shot or otherwise destroyed at every opportunity. It is rare, indeed, for hawks to come within gun range of a hunter without receiving a charge of shot, and they are killed in many localities by setting steel traps on the tops of posts or poles that the birds utilize as perches.

In England it is the duty of gamekeepers to kill all "vermin" that appear on the property under their charge, hawks being included in this category. On a large estate near the Thames I once saw a

"keeper's larder" where, near a frequented path, the gamekeeper had hung up his kills for display. These included the drying skeletons of sparrow hawks (a species related to the American sharp-shinned hawk), kestrels (allied to the American sparrow hawk), magpies, and jays, with a few small predatory mammals.

Belief in the destructiveness of hawks is almost universal. In most minds there is no distinction between hawks that habitually prey on birds and may destroy a certain amount of game, and the sluggish, heavy-flying species that feed consistently on wild mice and other destructive rodents, and so are beneficial to man.

The game commissions of many States have offered bounties for the heads of hawks and have expended hundreds of thousands of dollars in the destruction of untold thousands of them. The result is that in the eastern half of the United States these birds have decreased to less than a tenth of their former abundance.

Since the decrease has affected the beneficial kinds even more heavily than those that are classed as injurious, there has been an increase in destructive rodents formerly held in check by hawks, with the result that these animals have done severe damage to agricultural interests.

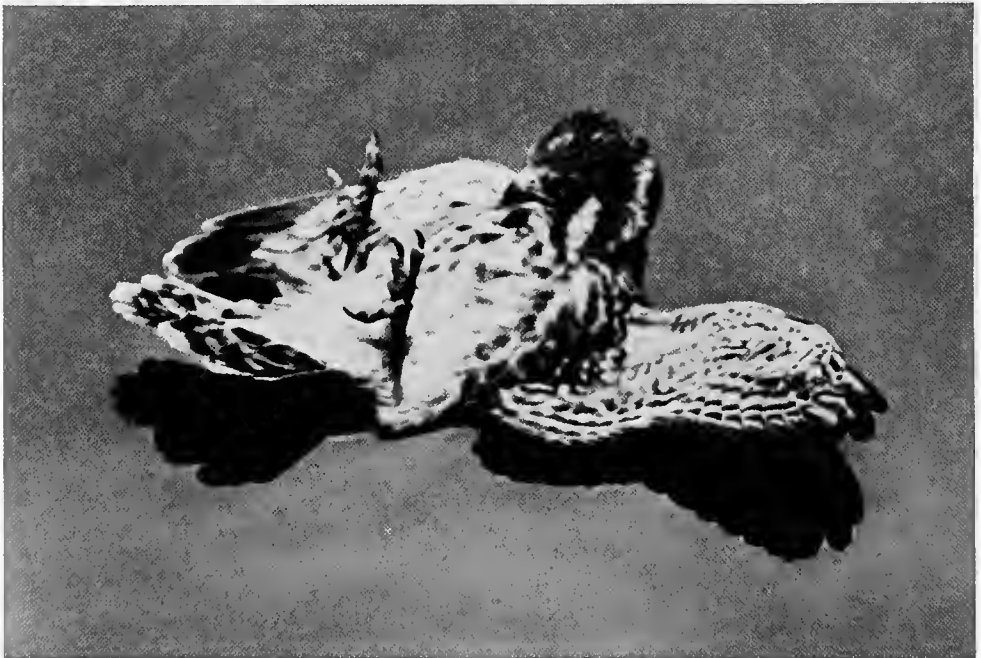
The Cooper's hawk and the goshawk are the principal species that are destructive to game, with the marsh hawk to be added in certain localities where pheasants and other game birds that range in the open are concerned. It may be permissible to keep these hawks in check, and to include among those to be killed the occasional individual of the red-tailed hawk or other species that acquires the habit of coming to the farmyard for chickens. There is, however, no excuse whatever for the widespread slaughter of all kinds of hawks that has been the fate of these birds for years.

Sportsmen have justified the indiscriminate killing of hawks on the ground that they were conserving game; in other words, with the excuse that they were providing more game for men to kill. Nowadays, with nature lovers, who do not hunt, equaling sportsmen in numbers, some consideration may be given to the rights of those who enjoy seeing hawks alive and studying their interesting ways, aside from the value that most of these birds have from their beneficial food habits.



Photograph by William L. and Irene Finley

WEIGHING FROM 20 TO 25 POUNDS, THIS OLD CONDOR HAD TO BACK-PADDLE, VIGOROUSLY IN LANDING ON THE PERCH



Photograph by Dr. A. A. Allen

DOWN BUT NOT OUT

A young sparrow hawk, not at all sure of the photographer's good intentions, assumes a characteristic defensive attitude. However, despite the belligerent pose, this species is perhaps the most friendly and sociable of all the hawks. When fully grown, the bird will not measure a foot in length.

Action should be directed against the injurious individuals rather than toward the group as a whole, for the killing of most hawks is as foolish a policy as would be the wholesale destruction of any other element that contributes to our welfare.

The majestic bald eagle, our national bird, has also fallen under the displeasure of some farmers and has been rather relentlessly hunted.

Bird lovers have taken up the fight on behalf of this great bird of freedom, declaring that he has been misrepresented and that his occasional thefts of poultry are more than offset by services in keeping our beaches clean of dead fish.

ABILITY OF EAGLES TO CARRY WEIGHT EXAGGERATED

The carrying or lifting power of hawks and eagles has been frequently exaggerated. The largest eagles can carry off young lambs and fawns, but in these the weight is not great. In observations in Montana, Cameron found that the golden eagle could bear away jack rabbits that weighed seven pounds or more. One seized and bore aloft a small cat, but dropped it quickly when the cat realized its plight and got into action.

Larger prey may be killed, but it is eaten on the spot and not carried away. Though the strongest eagles may be able to raise a weight of 10 or 12 pounds, it is doubtful whether they could carry this for more than a few feet.



Photograph by Charles Martin

A SOUTH AMERICAN CONDOR WHOSE PERMANENT RESIDENCE IS WASHINGTON, D. C.

This monarch of the Andes is one of the prime attractions in the fine collection of birds, animals, and reptiles housed in the National Zoological Park. The bare skin of his head, neck, and caruncle is dull red, and contrasts sharply with the white "fur" collar and dark plumage.

The hawk tribe consists of fierce, aggressive birds, and there is widespread belief in stories of eagles attempting to carry off children. Probably such tales are based in the main on the fierce manner in which these birds often swoop at those who intrude near their nests.

In Greek mythology we read the fanciful story of Ganymede, the beautiful Phrygian shepherd boy who was carried off by an eagle to Olympus to serve as cup-bearer to the gods. Also, in every mountainous country where there are eagles,



Photograph by William L. and Irene Finley

NEARLY EIGHT WEEKS OLD AND HARDLY HANDSOME

A young California condor still in the downy stage, whose feet seem to be growing faster than the rest of him.

there are current stories of the predatory attacks of these birds on children.

Possibly in primitive times, if small babies were left exposed, an eagle might have attacked them, just as it would a kid or a lamb under the same circumstances; but such a happening in the present day would be quite improbable.

In the Philippine Islands the powerful monkey-eating eagle (*Pithecopaga jeferyi*), a bird weighing from 16 to 20 pounds, is believed by the natives to attack men. R. C. McGregor was told of an instance where one of these birds, in protecting its nest, killed a Negrito; but he did not place entire credence in the story, as it came to him through hearsay.

When their nests are disturbed, falcons and other hawks swoop fiercely at the heads of intruders, and on occasion may actually strike a climber and cut him with their claws. But such attacks are usually more threatening than serious, though they are executed with a vicious dash that might well frighten the timorous.

Among the Indians of North America is a widespread belief in a "thunder bird"

of huge size. The legend may be based on former wide distribution of the California condor, or possibly on the extinct condor known as *Teratornis merriami*, a huge bird whose bones are found in Ice Age fossil deposits in California and Florida.

SOME HAWKS WHISTLE, CHATTER, AND LAUGH

The voice of most hawks is a harsh sound that in many instances is as wild in tone as the fierce birds themselves. Uttered as they float on broad pinions high in air, the weird cadences of their screams seem fitting and appropriate to the spreading landscapes they survey. Some species utter piercing whistles, others chattering calls. In some the notes are quite pleasing, though none possesses what might be termed a song. The adult turkey vulture is entirely silent except for a hiss, though the young are vociferous.

The strangest notes that I have heard from birds of this group have come from the handsome laughing falcons (*Herpethores cachinnans*) of the American Tropics. My first experience with these



“LET ME WHISPER IN YOUR EAR”

© William L. Finley

These old condors showed great affection for each other and for their chick. Condors do not nest every year, and raise only one chick when they do.

birds was in the Argentine Chaco near the Pilcomayo River, at that time a wild region where ranchers were just beginning to invade the territory of the primitive Toba Indians.

On my first evening in this remote section, I was engaged at twilight in setting traps for little animals at the edge of a forest. I remained on the alert for any possible dangers in a country that was new to me, as many tales had been told regarding the Indians.

Suddenly, through the trees a hundred yards away, came a loud shouting sound, repeated steadily, then varied at short intervals with a series of other calls, all uttered in curiously human tones. After a minute or two, another voice joined the first, and the two called rapidly in a strange medley that left me completely puzzled as to whether the authors were bird, beast, or human, as I crouched among the bushes, gun in hand, with my skin tingling pleasantly at the thrill of the unknown in a strange and possibly dangerous land.

It was a day or two later that I traced these weird, unearthly duets to the large, white-headed, bushy-crested laughing fal-

cons that were found everywhere through the forests.

The flight and appearance of hawks and other birds, and certain of their anatomical features, were used by the augurs of ancient Rome in their prophecies of the future.

INDIANS USE EAGLE FEATHERS AS ADORNMENT

A more practical use of these birds was found among the North American Indians, particularly of the Plains and Pueblo groups, when beautiful headdresses were made from the large feathers of the golden eagle, and other ornaments and decorations were fashioned from the smaller feathers of this bird and from the feathers of hawks. The downy bases of the eagle feathers sometimes were twisted in strands that were woven into feather blankets of a peculiar and interesting type. Hawks and eagle claws were used to make necklaces and other decorations.

The Pueblo Indians kept hawks in captivity, as they did turkeys and macaws, presumably to use their feathers in their prayers and decorations. Numbers of

bones of eagles and hawks were found in the excavations of the National Geographic Society at Pueblo Bonito. In some cases certain rooms seem to have been given up to these birds.

Occasionally hawks have been eaten for human food, but this is not a widespread practice. In Puerto Rico and Haiti I found that in some sections the natives considered the red-tailed hawk an excellent meat. The sharp-shinned hawk is eaten occasionally in the United States. From personal experience I can say that they have a fair flavor.

HAWKS USED BY MAN IN HUNTING

From the earliest times of which we have record, hawks of various kinds have been trained by man for use in hunting.*

For this purpose young hawks are taken from the nest, or adult birds are trapped alive. In either case, the birds are accustomed to man and his ways and are trained to come to be fed until they are tame and can be handled. They have the eyes covered with a soft leather hood and thongs attached to their legs, by which they may be tethered if desired. In hunting, trained hawks are taken afield until game is sighted, when the hood is removed, so that the hawk may sight the quarry.

As it flies, the hawk ordinarily maneuvers so as to rise and strike down at the game from above. In the case of wily, fast-flying birds, there is often a prolonged pursuit, in which only the most skillful hawk may hope to be victorious.

The peregrine falcon, distributed over most of the world, has been a favorite with hawkers, because it is fierce and at the same time is tractable in training. Several other falcons have been used, but to less extent.

These birds kill their prey in swift flight in air, striking a quick blow with the foot that knocks the victim end over end and frequently kills it outright. The goshawk is also used in hunting. This species kills in short, swift flight, bears its prey to the ground, and holds fast with its long claws until its quarry is dead.

Among native peoples of Central Asia, the golden eagle is trained to hunt small antelopes, foxes, and even wolves. These

heavy birds are carried afield perched on horses or on stands swung between two horses. In some cases they rest on a heavy leathern gauntlet on the forearm of the hunter, whose arm is supported in a forked stick resting in the stirrup (p. 48).

Scenes depicting hunting with hawks are found among the ancient paintings in the tombs of Egypt, and this sport was well known in India, Asia, and Europe at a very early date. Practiced originally to obtain wild game for food, it finally developed into the sport of the nobility and the wealthy. Though it fell into decadence with the development of gunpowder and guns, it is even practiced to-day in a limited way, both abroad and in our own country.

Though most birds of the hawk group range from large to medium in size, there is considerable variation in this respect.

The smallest are the little falconets of the Indian region and Africa. They are not much larger than bluebirds, but are as fierce as the largest falcons. They eat many insects and also kill small birds and mammals. They have been known to kill birds four times their own weight, and are so aggressive that in captivity they often dominate other hawks much larger and stronger.

The largest members of the group are the larger vultures of the Old World and the condors of America, which reach a length of 40 to 50 inches, with a spread of wings that is broad in proportion.

The nests and eggs of hawks vary widely in location and appearance. The majority build nests of sticks and branches in trees, where they are often located at a considerable height from the ground. Some of the larger eagles and vultures nest on cliffs and rock ledges, where the sites may be reached only by the boldest of climbers.

Marsh hawks nest on the ground in prairie or marsh regions; sparrow hawks occupy holes in trees. Falcons lay their eggs in cavities in the face of cliffs, or, in some species like the hobby (*Falco subbuteo*) of Europe, occupy the abandoned nests of other hawks or of rooks and similar birds.

In some species the same nesting site is used for many years in succession. Since new material is added annually to the nest, in many cases it may grow to huge proportions. This is especially true with birds like the ospreys and eagles.

* See "Falconry, the Sport of Kings," by Louis Agassiz Fuertes, in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1920.



Photograph by George E. Stone

GALÁPAGOS HAWKS HAVE NEVER LEARNED THE FEAR OF MAN

The wild life of these Ecuadoran islands has evolved in almost complete isolation, and as a result has always been tame. The confidence which hawks have reposed in the human race has often been abused, but for some reason they are still outstanding in their fearlessness. The tree is a *bursera*, the small leaves of which are short-lived, leaving it bare most of the time. Its bark exudes an aromatic scent when it is brushed.

The eggs of this group are moderate in size relative to the bulk of the parent, particularly when the larger species are considered. They have strong, heavy shells, usually with roughly granular surface. In some instances the eggs are plain white, bluish white, or greenish white, but in most there are markings of brown, which appear slaty where overlaid by a thin film of the calcareous shell.

The eggs of most falcons are heavily spotted with reddish brown, being among the most handsomely and richly marked known.

Many species exhibit considerable diversity in the extent and amount of markings, the eggs in some cases varying from plain white without markings to those that have the background completely obscured by a heavy wash of warm color.

CALIFORNIA CONDOR

(*Gymnogyps californianus*)

The California condor shares with the condor of South America the honor of being the largest living hawklike bird found in the New World, exceeding in size the largest of the eagles, and being much larger than its relatives, the turkey and black vultures.

Formerly quite abundant, according to recent estimate by Mr. Harry Harris, possibly ten individuals still exist in California. Little is known of them in Baja California, save that Indians hunt them for ceremonial purposes. But it is certain that few remain, and the species is one that may easily become extinct.

In days past, the California condor ranged into open valleys and other regions where it was easily accessible, but, to see it now, it is usually necessary to penetrate the wildest and most difficult mountain sections.

CONDORS ARE EASILY DISTINGUISHED

By those who penetrate its haunts, the condor is confused with no other bird. Straining eyes may examine distant eagles and turkey buzzards, but when a condor is sighted there is no mistaking it for its smaller relatives. Its enormous size and the broad sweep of its wings distinguish it almost at a glance when it is far distant. When nearer at hand it is marked by prominent white patches on the under side of the wings.

The condor uses soaring flight as consistently as does the turkey vulture, but is more a master of the air and can travel at higher speed. The birds range widely over the mountains, but seem to have certain limits within which they may be found at all seasons of the year. Several may occur together, except during the nesting season, when they separate into pairs and resent intrusion of others.

Although not ordinarily quarrelsome, it is said that, when provoked, the condor can drive the golden eagle from its haunts.

The food of the condor is composed of the flesh of dead animals, either fresh or in a state of decay. The feet are not adapted for seizing, but the birds hold down their food while they tear it apart with their strong bills. A diet of carrion would seem to be taken partly because the birds have no other choice. In captivity they are fed

on fresh meat, and some individuals, when accustomed to this ration, have refused to take flesh that was at all tainted.

The size of the California condor is indicated by its wing spread, which ranges by actual measurement from 8 feet 4 inches to 9 feet 9 inches. There are numerous reports of birds with a breadth of wing in excess of the maximum given, but these seem to be based on estimate and have not been substantiated. Though many statements that attribute larger size to the South American condor have been made, authentic measurements indicate that it and the California condor are similar in size.

The California condor places its single egg on the bare surface in a recess, cave, or pothole on a rocky cliff, often in a cavern formed by leaning slabs of stone, and formerly was reported nesting in hollow tree trunks and hollow logs. The egg, found from January to March, is white with a bluish or greenish tinge, and measures about $4\frac{1}{2}$ by $2\frac{1}{2}$ inches, or about the size of the egg of the domestic goose.

The young when hatched are covered with white down, except for the head, which is bare. From captive individuals it appears that these birds are not adult until they are more than three years old. Young birds utter curious hissing, growling calls, but adults are silent.

The nestlings grow slowly and are under parental care for about six months before they are able to fly. They seem to have greater longevity than most birds, since three living in captivity in the National Zoological Park in Washington, D. C., are now thirty years or more old.

AGES AGO THIS MIGHTY BIRD RANGED EAST TO FLORIDA

The California condor in historic times ranged from the Columbia River south along the western slopes of the Sierra Nevada, and from Humboldt County, in the same State, through the Coast Ranges into northern Baja California, extending casually into Oregon, Washington, and southeastern California.

It is now confined to the Coast Ranges in northern Ventura County, southwestern Kern County, and southeastern Santa Barbara County, and to the San Pedro Martír Range of northern Baja California. Its bones are found in ancient caves in Texas, Nevada, and New Mexico, and in Ice Age deposits in Florida.

EAGLES, HAWKS, AND VULTURES



© National Geographic Society

These figures are approximately one-tenth natural size

CALIFORNIA CONDOR

Bird on perch and one flying near by, adults; upper and lower flying figures, immature



© National Geographic Society

BLACK VULTURE
Upper

Approximately one-eighth natural size

TURKEY VULTURE
Lower

BLACK VULTURE*(Coragyps atratus atratus)*

The black vulture is distinguished from the turkey buzzard, even at a distance, by its short, square-ended tail, and by the peculiar method of flight in which the wings are flapped rapidly, followed by a short sail with stiffly extended pinions. Large light patches across the ends of the wings form another prominent mark for field identification.

The black vulture subsists on carrion, and often gathers in greedy hordes that soon leave the bones of large carcasses picked clean. It is active and aggressive, and at its feasts will drive away the meeker-spirited turkey vulture. It is said to kill young chickens, young pigs, and lambs when opportunity offers, so at times it may be quite destructive.

Occasionally it utters a low, guttural note, quickly repeated, that is barely audible a hundred yards away.

Because of their scavenger services, these birds are seldom molested and often become so tame as to be almost domestic, coming into towns to feed familiarly with dogs on refuse in the streets and barely moving aside to avoid passing animals or men.

They often frequent heron and pelican rookeries, where they pick up dead fish beneath the nests, and also swallow young birds left unprotected.

The nest is placed on the ground, usually under dense bushes, but occasionally in hollow trees, logs, or recesses beneath boulders. The eggs rest on leaves or on the bare ground. Where abundant, the birds often breed in colonies. Two eggs constitute the usual set, with one or three found occasionally. The color is light green, spotted rather sparingly with brown and lavender.

The young when hatched are covered with buff-colored down quite different from the white found in the turkey vulture. The nestlings are fed entirely by regurgitation.

These birds are not known to carry food or any other object, either in the feet or in the bill.

The black vulture is found from western Texas, southern Illinois, and southern Maryland south into Mexico and Central America, being recorded casually north of its regular range. An allied form is known in South America.

TURKEY VULTURE*(Cathartes aura septentrionalis)*

A master of the art of soaring, the turkey vulture or turkey buzzard wheels in the sky by the hour, turning in lazy circles and spirals, seldom moving the wings except to adjust them to the air currents through which it moves to maintain its elevation. Although graceful on the wing, when at rest all attractiveness of appearance is lost.

With broad wings folded against its relatively slender body, its bare head and its awkward attitude, the buzzard seems uncouth or even repulsive.

Like other members of the family, it subsists on the bodies of dead creatures, eaten fresh or in advanced stages of decomposition. I have had them come to tear the flesh from the body of a dead bird that I had just skinned, and have found them feasting on putrid flesh.

WINDLESS DAYS KEEP THE BUZZARD AT HOME

Turkey vultures by day cover wide areas in search of food, and at night gather to sleep in some tract of woodland, several hundred often congregating in one roost. In early morning they sit with wings expanded to catch the warmth of the sun, and on dull, cloudy days, when the air is still, may remain in their roosts throughout the day, as without moving currents of air they find flying difficult.

The turkey vulture places its nest in some recess beneath large boulders, in a hollow log or tree, or in sheltered situations beneath shrubs. The handsome eggs, usually two in number, rarely one or three, are creamy white, spotted with brown and lavender. Occasionally one is found without markings.

The young bird when disturbed utters a curious growling, hissing call, like some angry cat, turning its back the while and striking the ground sharply with the tips of its spread wings in a manner that is truly startling. The adult is silent except for a hiss made by expelling its breath from the windpipe.

The turkey vulture ranges from southern British Columbia, Wisconsin, and central New York south into northern Mexico. Closely allied races extend through Cuba and Central and South America to the Falkland Islands. The bird has been introduced into Puerto Rico.

SWALLOW-TAILED KITE*(Elanoïdes forficatus forficatus)*

The swallow-tailed kite, delighting in its aerial powers, spends hours on the wing wheeling and turning without apparent effort. The deeply forked tail, the white plumage, and black wings and tail form unmistakable marks for field identification.

This species feeds extensively on snakes and also eats lizards and large insects. All food is seized expertly in the feet, and the birds customarily eat while flying, tearing their prey apart with their bills. They are believed to be entirely beneficial.

The nest of the swallow-tailed kite is built in trees, often from 60 to 125 feet from the ground, and is composed of twigs and moss, the nesting material being seized while flying. Two eggs generally constitute a set, although from one to four may be found. These vary in ground color from dull white to a delicate cream, and are spotted and blotched with brown. The call is shrill and high-pitched, being heard mainly during the nesting season.

Formerly this beautiful hawk was common throughout the eastern United States, but in the last 30 years its numbers have lessened steadily, and now it is found mainly in the southern section.

The species breeds locally from Minnesota, Indiana, and North Carolina south into Florida and eastern Mexico, wintering south of the United States. An allied form is found in Central and South America.

MISSISSIPPI KITE*(Ictinia mississippiensis)*

The Mississippi kite is another species that spends hours in the air in tireless movement.

The food of this bird consists principally of insects, with occasional reptiles and frogs. I once encountered a band of a dozen coursing over a range of low hills, and at intervals darting down to seize a cicada. Held in the hawk's foot, the insect buzzed protestingly until, without a pause in the bird's flight, it was swallowed.

The Mississippi kite builds a small nest composed of twigs, in part with leaves still attached, placed in trees from 25 to 60 feet from the ground. The birds breed in May and June, later in the season than most species of this family.

The eggs number two or three and are pale bluish white, without markings, though often stained by the decaying green leaves of the nest lining. Only one brood is reared each season. The immature bird in the first fall is whitish below, streaked with dark brown and buffy.

This kite nests from northeastern Kansas, southern Illinois, and South Carolina south to Texas and Florida. In winter it is found from Florida and Texas to Guatemala. It has been noted casually from Colorado to Pennsylvania and New Jersey.

WHITE-TAILED KITE*(Elanus leucurus majusculus)*

Like related kites, this species is master of the air and flies with extreme ease and skill. It delights in high winds, breasting them like a gull without the slightest difficulty.

It is found over tree-dotted prairies and savannas, marshes, and semi-open valleys. Though fifty years ago it was common, it has decreased steadily until now it is to be classed among our unusual birds. Despite the fact that it has been afforded protection in recent years, the species does not seem able to increase.

The white-tailed kite, in feeding, frequently hovers with rapidly beating wings over one spot for several minutes, watching the vegetation beneath closely, ready to pounce down whenever prey appears. It lives on small snakes, lizards, frogs, and large insects, and seems to be entirely beneficial.

The note of this kite is said to be somewhat like that of the osprey, but terminating in a guttural or grating sound.

The nest, built of twigs and lined with soft materials, is placed from 25 to 50 feet from the ground.

The eggs, varying from three to five, are creamy white, heavily marked with blotches of brown. The young have the plumage tinged with brown and are indistinctly streaked above.

The white-tailed kite is found in California from the upper Sacramento Valley and Humboldt County, south to northern Baja California, and from Texas, Oklahoma, and Florida to Guatemala.

An allied race ranges in South America, and similar species are found in the other inhabited continents.

EAGLES, HAWKS, AND VULTURES



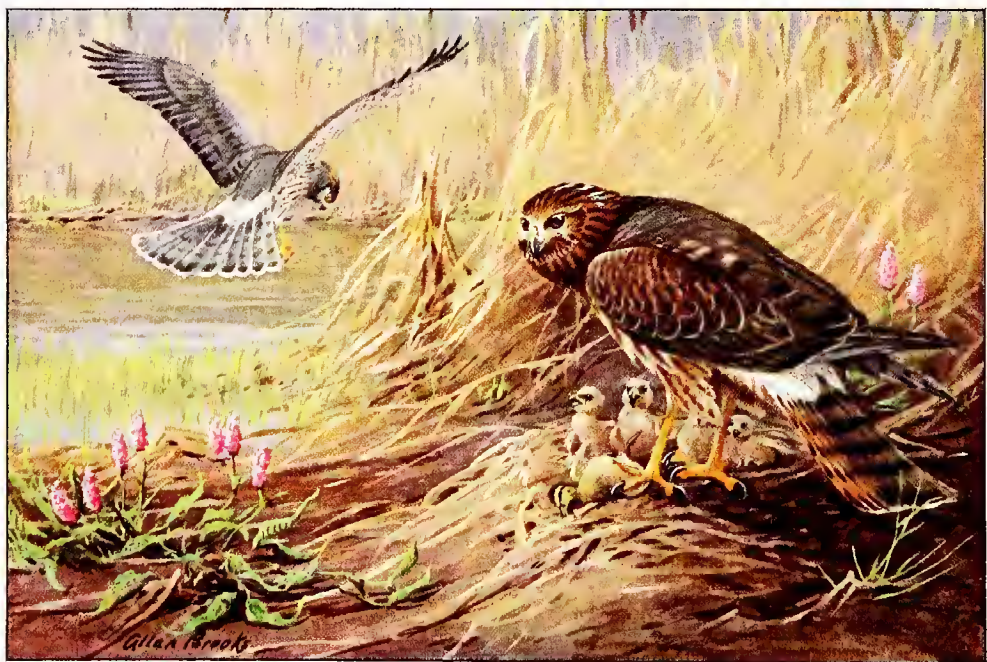
© National Geographic Society

Approximately one-eighth natural size

SWALLOW-TAILED KITE
Perched and flying adults, above

WHITE-TAILED KITE
On ground at left

MISSISSIPPI KITE
Perched at right and flying in distance



© National Geographic Society

EVERGLADE KITE

Upper; adult perched and immature flying

Approximately one-eighth natural size

MARSH HAWK

Lower; female at nest with young; male flying

Crepuscular. Carrion feeders & frog-catchers. Small of foot & lacking courage (especially in full daylight). Fakers, foot slappers & pushers. N.G. for much of anything.

EVERGLADE KITE*(Rostrhamus sociabilis plumbeus)*

This resident of fresh-water marshes is suggestive in form, white rump, and method of flight of the much larger, longer-tailed marsh hawk. It enjoys soaring, frequently ascending to considerable altitudes, but does not have the graceful, accomplished flight of our other kites. The everglade kite is sociable, and, where plentiful, a hundred may be observed together. In Florida, however, it has been so reduced that flocks are unusual.

The birds utter a rasping, chattering call of little volume, and are especially noisy during the mating and nesting season.

For food this kite depends on the large fresh-water snails belonging to the genus formerly called *Ampullaria*, known now as *Pomacca*. The kite seizes them in its long claws and bears them away to some low limb or mound, where, with the slender, sharply hooked bill, it draws the snail from its shell.

Occasionally the kite extracts its food as it flies, dropping the shell when empty. I have seen accumulations of dozens of the shells gathered beneath favored perches. So far as known, this kite eats no other food. Such extreme specialization in diet is unusual among birds. The slender form of the bill and the claws, developed for this peculiar habit, is remarkable.

The everglade kite in Florida nests from January to May, the season varying locally. The nest is made of small twigs placed in a myrtle or other bush, in the top of a clump of saw grass, or, rarely, in a tree, being usually at only a few feet elevation and ordinarily above water.

The eggs number two to five or rarely six, two or three making the usual set. The ground color is pale greenish white spotted with rusty brown, the spots in most cases being so numerous as almost to conceal the lighter base. The young of the everglade kite are fed on the same large snails relished by the adult, the parent usually bringing food in the crop and feeding its family by regurgitation.

In the United States the everglade kite is found only in Florida. To the south it ranges in Cuba, eastern Mexico, and Central America, and a closely allied race occurs in South America as far as Argentina.

MARSH HAWK*(Circus hudsonius)*

The marsh hawk, an inhabitant of open country, ranging over prairie regions, grasslands, and cultivated fields, is marked by its slender form, long tail, and a prominent white spot on the rump. Except during migration or in mating season, this bird seldom flies far above the ground for any great length of time.

It is entirely predatory, feeding on mice, ground squirrels, and other small mammals, as well as snakes, lizards, frogs, and insects. In addition, it captures a good many ground-inhabiting birds, especially in summer and fall, when young birds are about. At times it kills game birds and in some localities, particularly where pheasants are stocked, the marsh hawk has proved a pest. In general, however, it is beneficial, and should not be destroyed except where it is found to be actually injurious to game.

A FEATHER RUFF ADORNS THIS HAWK

As a peculiar feature, the face in this species is surrounded by short, stiffened feathers forming a ruff like that found in owls, a feature that is present in no other group of hawks.

The marsh hawk places its nest on the ground, usually in a marsh or on a prairie, ordinarily at the foot of a bush or a clump of grass, and in marshy ground on a tussock. It is composed mainly of dried weed stems and grass, sometimes with a foundation of twigs, lined with fine grasses and feathers.

From four to six eggs constitute a set. These are pale greenish or bluish white in color, usually without markings, though at times blotched and spotted with brown. The male is attentive to the female during incubation, bringing her food, which she often rises to seize in the air as he drops it.

As is often the case with ground-nesting birds, the young wander about on foot near the nest before they are able to fly.

The marsh hawk breeds from north-western Alaska, central Quebec, and Newfoundland south to northern Baja California, southern Texas, and southeastern Virginia. In winter it is found from British Columbia and the northern United States south to the Bahamas, Cuba, Haiti, Puerto Rico, and Colombia.

SHARP-SHINNED HAWK*(Accipiter velox velox)*

This small hawk, one of the most widely distributed of the group in North America, is an inhabitant of thickets and woodland. It may be readily identified by its short wings and long tail, the square end of the latter distinguishing it from the larger Cooper's hawk. Though fiercely predatory, flying swiftly in pursuit of prey, this bird spends long periods in resting quietly in trees or bushes. As it usually perches among limbs or leaves, it is often overlooked until it flies.

The sharp-shin feeds almost entirely on birds and is highly destructive. Although it preys mainly on small species, such as sparrows, warblers, and similar forms, it does not hesitate to attack birds as large as itself, regularly killing quail, mourning doves, and flickers.

In southward migration in fall, these hawks often follow definite lines of flight, so that thousands may pass leisurely by certain points in the course of a few days. Sometimes during these flights stuffed owls are used as decoys to attract the hawks, so that they may be shot.

The sharp-shinned hawk makes a bulky nest of twigs, sometimes without an inner lining, but often with a slight padding of soft bark or a few feathers. The nest is frequently placed in pines or spruces against the trunk of a projecting limb from 20 to 50 or more feet from the ground.

**SHARP-SHINNED HAWKS WILL FIGHT
FIERCELY FOR THEIR NESTS**

Three to five eggs usually make a set, though as many as seven have been found in one nest. The ground color is pale bluish or greenish white, blotched and marbled with brown and lavender. The sharp-shin is bold in defense of its nest and I have had one strike fiercely at me, returning with chattering calls to the attack time after time.

The immature sharp-shin has the underparts longitudinally streaked with dusky. The female is much larger than the male.

This species breeds throughout most of the United States and Canada from the northern limit of trees south to Florida, Texas, and south-central California. In winter it is found from British Columbia and the northern United States south to Panama. Allied races are found in the Greater Antilles.

COOPER'S HAWK*(Accipiter cooperi)*

This hawk, in appearance and habits, is a large edition of the sharp-shin. Since the sexes differ markedly in size, the female being much larger, a small male Cooper's hawk is about the size of a large female sharp-shin, the rounded instead of the square-ended tail offering the most evident character for distinguishing between the two.

The Cooper's hawk is the ogre in the world of our birds. Fierce and ruthless, it attacks grouse or other species as large as itself, and destroys smaller birds without the slightest difficulty. It darts through thickets with such ease that it is difficult for its victims to find cover for safe sanctuary. Rabbits and other small mammals, reptiles, and insects are eaten occasionally.

The bird is bold and fearless in pursuit of its quarry, and has been known to return several times to attack a chicken, even when people were present and threatening it. It is one of the hawks that merits the name of "chicken hawk" and must be considered entirely destructive. Indeed, it is responsible for much of the damage in the hen-yard for which its larger relatives that live more in the open get the blame. It is also a consistent enemy of ruffed grouse and quail.

This species often follows the lines of fall migration frequented by the sharp-shin, but is less abundant; so that it is killed by hunters along these flyways in smaller numbers.

Cooper's hawks may appropriate the last year's nests of crows or other hawks, or may build a new structure. In either case the nests are composed of coarse twigs lined with finer material of the same kind, the whole frequently mixed with fragments of bark.

The eggs range from three to five in number, with the ground bluish white or greenish white, sometimes plain, but more often spotted with brown. In the nesting season the Cooper's hawk is quite noisy, uttering loud, harsh notes that are rapidly repeated. The immature bird is streaked underneath with dusky.

The Cooper's hawk nests from southern British Columbia, southern Quebec and Nova Scotia south through the United States into northern Mexico. In winter it is found south into Costa Rica.

EAGLES, HAWKS, AND VULTURES



© National Geographic Society

SHARP-SHINNED HAWK ✓
Upper; adult female

Approximately one-seventh natural size

COOPER'S HAWK ✓
Lower; adult male



© National Geographic Society

GOSHAWK

Approximately one-seventh natural size

HARRIS'S HAWK ✓

A smaller hawk than the European Goshawk, but within its slightly lesser scope equally excellent. Big individuals breed in boreal Canada, only small ones in the U.S.A. Competition with red tails limits it to woodlands in U.S.A., & limits it to even here! VI
 the goshawk's pride & traditional character

^{Lower} suggested by Harold Webster as potentially excellent for austringing at Goshawk-like flying. Probably so. No one has tried it, yet (1965). Alan W. Davis, VT, summer 1965. Put his intermedial address 22? from N. Mexico. via

American GOSHAWK*(Astur atricapillus)*

The goshawk, one of the fiercest and most destructive of our birds of prey, exceeding the large falcons in this respect, inhabits the forests of the north and of the western mountains. It comes south sporadically from the far north during winters when there is a failure of its food supply, but at other times seldom is seen except along our northern border. Its flight is swift and powerful, and I have seen it easily overtake grouse and other fast-flying birds on the wing.

In the north the goshawk eats Arctic hares, lemmings, and ptarmigan. In its southern invasions it is the foremost enemy of the ruffed grouse, so that in the year following a goshawk flight there always is noted a decrease in these game birds.

With these propensities, naturally this hawk is highly destructive to poultry, seizing chickens and boldly carrying them away. When its hunting instincts are aroused, it seems to lose all sense of fear, so that it will return for chickens even after having been stung with shot. It does not hesitate to attack other predatory birds and will fight with large owls until both combatants are killed.

The goshawk builds bulky nests of sticks in either conifers or deciduous trees, but usually in heavy forest. The bird is fierce in defense of its home and will not hesitate to attack a human intruder.

The eggs vary from two to five, with three or four as the usual number. They are pale bluish white, often unmarked, but sometimes with a few spots of brown. The call is a shrill note sharply repeated, being heard principally in the breeding season. The young in the first fall have the under surface streaked like the immature Cooper's hawk.

Two races are recognized. The eastern goshawk, *Astur atricapillus atricapillus*, paler in color, breeds from Alaska, Quebec, and Nova Scotia south into British Columbia and the northern United States, extending south as far as western Maryland. In its sporadic southern flights it comes into the Central States and irregularly into the Southwest. The western goshawk, *Astur atricapillus striatulus*, nests in the Pacific coast region from Alaska south to California and northern Mexico.

HARRIS'S HAWK*(Parabuteo unicinctus harrisi)*

This is a handsomely colored hawk, common only in a restricted area in the United States. Although accomplished in flight, so that it delights in turning in huge circles high in air, it is of quiet demeanor and often rests for hours on open perches from which it may survey the land.

In southern Texas it is remarked frequently on telephone poles along the highways. In this region it is fairly tame and unsuspecting, often allowing automobiles to pass without taking flight, but in other areas it has been reported as wary.

The call is a harsh scream, and the birds at times are quite noisy in the vicinity of their nests.

Though in South America a closely related race has been reported consorting with vultures and caracaras and feeding on carrion, such is far from the case here.

In Texas, Harris's hawk has been observed dashing quickly through mesquite thickets, searching for wood rats and ground squirrels, and in southeastern California Dr. Loye Miller found parts of a green-winged teal in the stomach of one, and bird remains, including a gilded flicker, in another. They are said also to eat lizards, and seem, on the whole, to be beneficial in their habits.

The nests are composed of sticks, small branches, and weeds, lined with rootlets and grasses. They are placed in trees or sometimes on the tops of the Spanish bayonet or the giant cactus.

From two to four eggs are deposited, these being dull white or with a faint greenish tinge, some without markings and some spotted irregularly with brown or lavender. The birds ordinarily offer no objection when their nests are approached, beyond uttering their usual calls and circling in the air overhead.

The young differ from the adults in having the under surface buffy white and broadly streaked with blackish brown.

Harris's hawk is found in southeastern California, southern Arizona and New Mexico and the lowlands of south Texas, extending to Louisiana and Mississippi, and ranging south into Baja California and Central America as far as Panama. It has been observed casually in Kansas and Iowa. A related race is found in South America.

Suggested by Harold Webster.
The one I have seen (3 yr inter-
mewed eyes, said to be ♀) flew
like a ♀ Cooper. Had taken wild cat.

RED-TAILED HAWK
(*Buteo ~~borcaus~~ ^{jamaicensis}*)

This fine bird, under the name of "chicken hawk," is universally known, as it is conspicuous and widely distributed, although ranging by preference in hilly or mountainous regions where there are forests. It is strong and graceful on the wing and spends hours in soaring in wide circles, sometimes so high in the air as to be almost out of sight. Its flight is not particularly swift, and it often rests for long periods on limbs or the tops of dead trees, where it has a commanding view.

The red-tail is preëminently a mouse hawk, meadow mice particularly being a staple article in its diet. It also eats other mice, squirrels, gophers, rabbits, kangaroo rats, wood rats, moles and shrews, has been known to attack skunks, and also kills snakes and lizards. In summer and fall, particularly in the Western States, it consumes many grasshoppers when these appear in pestilential abundance.

Ground-inhabiting birds are eaten at times, but, on the whole, the red-tail is distinctly beneficial, meriting protection except where some individual acquires the habit of eating chickens. In spite of the good that it does, it is shot on every occasion and has been so reduced in many sections of the eastern United States that it is now a rare bird.

The nest of the red-tail is a large structure of sticks, sometimes with a slight lining of soft materials. The eggs vary from two to four, being creamy white, occasionally unmarked, but ordinarily spotted with shades of brown. In the South these birds begin to nest in February, the nesting period being governed in the North by the date of the opening of spring.

The voice is a high-pitched scream, a stirring sound usually being given as the birds circle high in the air. The immature bird in the first fall has the tail brown, barred with blackish.

This is one of the species that formerly appeared in southward migration in abundance, but the soaring flocks of early days are now things of the past and each year the birds seem to become fewer.

In its wide range from Alaska through central Canada to Nova Scotia and south through the United States, the red-tail is divided into five geographic races, and other forms are found in the West Indies and Central America.

RED-SHOULDERED HAWK
(*Buteo lineatus*)

This common cousin of the red-tail ranges in wooded country, and can maintain itself where groves and trees border cultivated fields. Though it delights in soaring, it seems somewhat less active than the red-tail. It may be distinguished on the wing by the narrow barring of the under-wing surface.

The food is highly varied, including mice, rats, snakes, frogs, fish, large insects, centipedes, spiders, crayfish, earthworms, and snails. It seems to take even fewer birds than the red-tail, and only occasional individuals acquire the chicken-killing habit or attack game birds. There are numerous instances on record where these birds have nested in woods adjacent to hen-yards without attempting in any way to molest the poultry.

On the whole, this hawk should be protected, though many are wantonly killed by hunters, so that the species is decreasing in many localities.

"RED-SHOULDERS" NEST HIGH OR LOW

The nest of the "red-shoulder" is made of twigs, placed in trees often at a considerable elevation, but occasionally as low as 18 or 20 feet. The number of eggs in a set varies from two to six, with three or four as the usual number. These are white, sometimes with a yellowish or bluish tinge, marked with shades of brown and gray. Eggs without markings are rare.

The calls of the red-shouldered hawk are loud, wailing screams that may be heard for some distance. They are mimicked by the bluejay so perfectly that it is often difficult to distinguish the imitation.

The northern red-shouldered hawk, *Buteo lineatus lineatus*, ranges from southern Canada to southern Kansas and North Carolina, migrating to the Gulf coast in winter. The Florida red-shoulder, *Buteo l. alleni*, which is smaller, nests from Oklahoma and South Carolina to Louisiana and southeastern Florida.

The insular red-shoulder, *Buteo l. eximius*, still smaller and paler in color, is found in the Florida Keys.

The Texas red-shoulder, *Buteo l. texanus*, with richer color below, nests from southern Texas to Tamaulipas; and the red-bellied hawk, *Buteo l. elegans*, with more rufous below, is found in California and northwestern Baja California.



© National Geographic Society

Approximately one-seventh natural size

RED-TAILED HAWK ✓

RED-SHOULDERED HAWK

Upper; adults perched and flying above,
immature bird flying at left

Lower; adult (left),
immature bird (right)

A rival of the goshawk in woods hunting and versatile enough to hunt the open fields, from treetop or waiting on positions. Can handle cottontails & pheasants readily. Excellent for avstraining. Will

Mostly fussy & feathers much smaller (lighter in weight) than appearances suggest. Small feet, small spurage; a slapper & scratcher, not a butcher. A faker; useless for avstraining.



© National Geographic Society

BROAD-WINGED HAWK

Upper; adult perched,
immature flying

Small. Mostly feathers.
Mouse, reptile, insect eaters.
Tiny feet, tiny courage,
slappers & fakery, not club-
bers. Useless for austing-
ing

· Approximately one-seventh natural size

SWAINSON'S HAWK

Lower; adult in light phase on ground,
light and dark phases flying

Carriion feeders. The ones I have
seen & handled, wild & tame, were
dirty, literally lousy, chicken-footed
lacking courage, slappers, not club-
bers, & generally useless for
austtineing.

BROAD-WINGED HAWK*(Buteo platypterus)*

The broad-wing, smaller than the red-shoulder and red-tail, lives in woodlands, where it is seen only by those conversant with its habits, as it perches usually under cover of the leaves. In soaring it frequently rises until it is nearly out of sight. Swampy woodlands and broken country covered with forests are favorite haunts of this species, and as the trees are cleared it decreases in abundance.

It is entirely inoffensive in its habits. Except in migration, comparatively few are shot, as most depart for the South before the season for fall hunting.

The food is mainly mice and other small mammals, frogs, reptiles, and insects. It eats small fish occasionally, but seldom takes birds. Large caterpillars are a regular item in its diet. It is partial to grasshoppers, crickets, and large beetles, and has been known to eat centipedes. It must be considered beneficial and worthy of every protection.

The nests of the broad-wing are constructed of twigs, placed in a large tree, often at a considerable elevation. Green leaves are often found in the nest, and some birds add fresh leaves to the nest lining nearly every day. The eggs range in number from two to five, with two or three as the usual number. They are dull grayish white, or occasionally greenish, spotted more or less extensively with different shades of brown and lavender.

Occasionally these birds will dash at an intruder. I remember distinctly, as a small boy, the start that one of these hawks gave me by swooping at my head as I sat on a limb beside its nest, high above the ground, admiring the eggs and the nest construction. The ordinary call is a shrill, double-noted whistle high in pitch, which is accompanied by chattering, scolding notes.

The birds vary considerably in color and markings and occasional individuals are found that are entirely black.

The broad-winged hawk nests from central Alberta, New Brunswick, and Nova Scotia south to the Gulf coast and central Texas. It migrates south to northwestern South America, wintering mainly from southern Florida and southern Mexico southward. Allied races are found in the islands of the Lesser Antilles.

SWAINSON'S HAWK*(Buteo swainsoni)*

Swainson's hawk lives in regions where tree growth is scant. Though strong in flight and delighting in soaring, it spends hours resting on some open perch where it may watch the country. Except when it has been unduly persecuted, it is tame and unsuspecting, allowing close approach without taking alarm.

The food of this hawk is varied and includes more insects than usual in a bird of its size. It feeds extensively on grasshoppers in late summer and fall, and also eats mice, rats, lizards, snakes, frogs, and rabbits. Though on rare occasions it may attack poultry, it is considered one of the most valuable hawks in the West in its relation to agriculture.

Swainson's hawk nests in trees or on cliffs, where its bulky home, composed of sticks, is often visible at a distance. The eggs, varying from two to four, are greenish white or yellowish white, spotted with brown and lavender, occasionally being without markings.

HAWK AND SONG BIRD NEST IN SAME TREE

In the regions of scanty tree growth inhabited by these hawks, it is a regular occurrence to find an isolated tree with nests of several species of birds clustered in it. Western kingbirds and Bullock's orioles often nest within a few feet of the large structure made by Swainson's hawk, and all live in harmony. Indeed, the home of a kingbird has been found located among the coarse sticks in the base of the hawk's nest.

In migration, both north and south, these hawks often gather in straggling bands, from 500 to 2,000 birds having been noted in such groups.

This hawk, like some of its relatives, has distinct light and dark color phases, these being illustrated in the flying birds of the opposite plate. Swainson's hawk has three of the outer primaries with the inner webs cut out or indented near the tip, and the red-tail has four. This difference will always serve to distinguish these birds in the hand.

This species breeds from British Columbia, Great Slave Lake, and Manitoba south to northern Mexico, and is found in winter in South America. Stragglers have been taken at many points in the Eastern States.

AMERICAN ROUGH-LEGGED HAWK*(Buteo lagopus s. johannis)*

From its summer home in the north, the American rough-leg comes into the United States in fall migration, often traveling in flocks. As the name indicates, the rough-legged hawks differ from our other species in having the leg feathered to the toes.

The American rough-leg is large and powerfully built, but, in spite of its strength, it feeds principally on mice, lemmings in the north and meadow mice in the south being staple foods. Rabbits are eaten where they are abundant, and large insects, such as grasshoppers, are eaten occasionally. The bird is entirely harmless, as it seldom kills other birds or poultry.

This hawk nests in the far north, ranging there in open country, seldom coming into densely forested areas. The nests are composed of sticks, the cavity lined with dry grass and feathers, and are built on ledges along bluffs or are placed in trees. The same location may be used for years, and the nest grows in bulk until it is of large size.

Eggs are two to five in number, with three or four making the usual set. They are pale greenish white, fading to dingy white, spotted and blotched with brown of different shades, and shell markings of lavender and gray. One brood is reared each season.

FEATHER LEGGINGS KEEP OUT THE COLD

The birds vary considerably in coloration from light to dark, but may always be distinguished by the feathered legs, or tarsi. The feather growth is heavy, particularly in fall and winter, so that the severest cold may be withstood. In the West they remain in the Northern States during the coldest weather of winter.

The note, heard mainly during the nesting season, is a low mewing call, suggesting the sound made by a young kitten.

The American rough-leg nests from the Aleutian Islands, the Arctic coast of Alaska, and northern Quebec, south to northern Alberta and Newfoundland. In winter it is found from southern British Columbia, Colorado, and southern Ontario south to southern California, Texas, and North Carolina. Closely allied races are found in Europe and Asia.

FERRUGINOUS ROUGH-LEGGED HAWK*(Buteo regalis)*

This handsome hawk, so large that it is often called an eagle, is found in regions of prairies and plains, avoiding heavy timber. It lives only in the western part of our continent, and in uninhabited sections still remains fairly common. However, when an increase in agriculture takes place in any part of its nesting ground, it is crowded out.

In much of its range it is known as "squirrel hawk," as ground squirrels and prairie dogs form a considerable part of its food. It also eats many pocket gophers. Birds, particularly meadowlarks, are captured during the summer season, and an occasional grouse may be taken, but these hawks are not known to harm poultry. They also eat large snakes. They are considered beneficial because of their destruction of harmful mammals.

Frequently hunting in pairs, they capture game that might otherwise escape. In hunting prairie dogs, the hawks rest until the animal is away from its burrow, when one gets between the prairie dog and its hole, thereby making capture an easy matter. The birds are strong and powerful and can carry rabbits to their nests with ease.

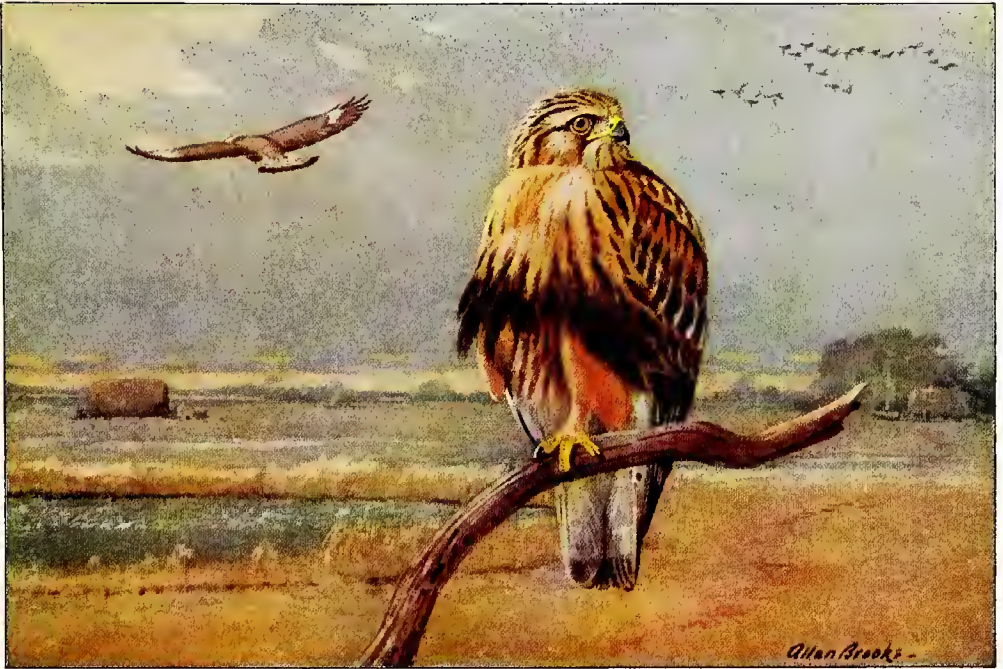
The nests are placed on cliffs, on sloping hillsides, or in trees, sometimes in localities difficult of access, sometimes where they can be approached without trouble. They are often occupied for years, and occasionally grow to large size, Taverner recording one about ten feet high. They are composed of sticks, those in the base being often of large size, with a lining of grass and other soft materials.

The eggs are two to five and are greenish or creamy white, blotched and spotted handsomely with brown and lavender. One brood is reared each season.

On their nesting grounds these hawks utter screaming calls that have been likened to those of eagles, and the young are said to be quite vociferous.

The ferruginous rough-leg breeds from southern Alberta and Manitoba to north-eastern California, New Mexico, and Kansas. It is found in winter from California and Montana to Baja California and northern Mexico, and has been observed casually in Wisconsin and Illinois.

EAGLES, HAWKS, AND VULTURES



© National Geographic Society

Approximately one-seventh natural size

(AMERICAN) ROUGH-LEGGED HAWK

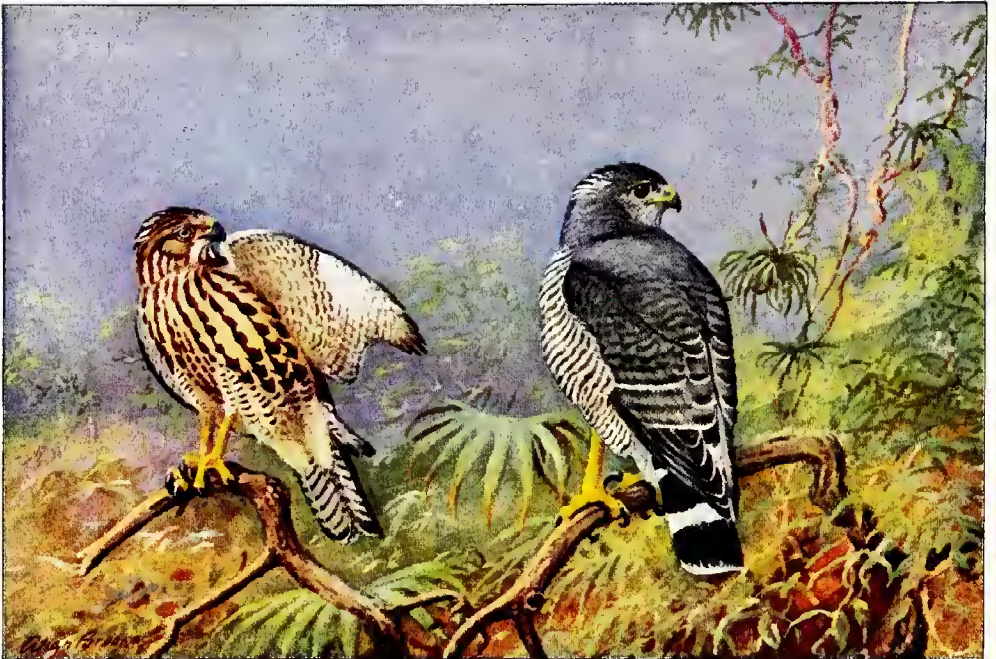
FERRUGINOUS (ROUGH-LEGGED) HAWK

Upper; ordinary light phase; adult perched,
immature flying

Lower; adult in light phase (left),
dark phase flying (right)

Have handled these, recommended by Harold Webster as possible for Aus. falconing. Find them chicken-footed & "chicken hearted", lacking in courage & aggressiveness. Fakers, slapping, pushing & scratching with their feet but never

This is said by Webster to have falconing (Aus. falconing) potential which possibly equals the redtail.



© National Geographic Society

These figures are approximately one-seventh natural size

MEXICAN GOSHAWK

MEXICAN BLACK HAWK

Upper; adult (right), immature (left)

Lower; adults perched and flying

MEXICAN GOSHAWK*(Asturina plagiata plagiata)*

Of graceful, rapid flight, this handsome species frequents groves of cottonwoods and other trees along streams in the open valleys, or in the foothills of the mountains. It is migrant within our limits, appearing rather late in spring and moving south early in the fall. The birds are usually tame, as in the wild country they inhabit there is little to molest them.

LITTLE ECONOMIC EFFECT CAN BE
ATTRIBUTED TO THIS HAWK

Lizards, abundant in its haunts, make up much of its food, and it feeds extensively on large insects, including grasshoppers and large beetles, which are said to be seized expertly on the wing. At need this bird can fly with a dash and speed which approximate those of a falcon. It eats various mice and rats, and also kills rabbits and ground squirrels.

It appears that this hawk is one of negative economic importance in the United States, and that, as an interesting species, it should not be disturbed or killed.

The nests of this goshawk are placed in trees. They are usually frail in construction, and made of twigs plucked green, so that they are still covered with leaves; this makes them difficult to see, as they match the dense green foliage in which they are placed. The nests are shallow and contain two or three eggs, the smaller number being more common. In color the eggs are pale bluish white, more or less stained from the nest lining of leaves; occasionally one is marked with a few spots of brown.

This species, although not brilliantly colored, from its contrasted markings is one of the handsomest of the hawks in our limits, its comparative rarity lending interest to the naturalist. It is an active bird, with powerful flight that enables it to dash through trees or other cover with ease, turning at need with the greatest facility. The call is a peculiar piping note that has been likened to the sound made by the long-billed curlew.

In the United States, the Mexican goshawk is found in southern Arizona, southern New Mexico, and the lower Rio Grande Valley, apparently being most common in Arizona. To the south it is found through Mexico, being replaced in Central America by a smaller race of paler color.

MEXICAN BLACK HAWK*(Urubitinga anthracina anthracina)*

The present form is another that enters the southwestern borders of the United States in a limited section, where it is an inhabitant of dense groves of trees. Though quiet and given to resting for long periods on some partly concealed perch, it is a bird of swift and active flight and rises at times to soar in the open air, being particularly sportive in spring.

The nest is a large structure of sticks that is frequently occupied year after year. It is often placed in a cottonwood or in a pine from 15 to 60 feet from the ground. Part of the sticks used for nesting material may be gathered on the wing, the bird dropping gracefully, sometimes from high in the air, to seize a dead branch in some tree top, snap it off, and carry it away without pausing appreciably in its course. From one to two eggs are deposited, being grayish white with a slight greenish tinge, spotted with brown and lavender.

In the north the birds rear but one family each season, but in the Tropics, if one set of eggs is taken, they often continue their domestic duties with a second or even a third nesting.

In British Honduras, where these hawks are common and are little molested, they are said to be very bold, sometimes perching only five or six feet away while their young are being examined.

The food of these birds, from what little has been recorded, seems somewhat varied. They are said to eat a good many snakes and lizards, and also to consume frogs and fish. Sometimes they pursue birds, and along the coast of Central America they are reported to live to a considerable extent on crabs, large land crabs being favored food. They are said also to eat rodents of various kinds and large insects.

They are too rare within our limits to have any particular economic status, but should not be destroyed wantonly, as they are interesting and peculiar, and represent a group not otherwise found in our fauna.

The call of this bird is described as high-pitched and quavering.

The species is found from southern Arizona and the lower Rio Grande Valley in Texas south into Central America, being mainly migratory in the United States. Allied forms are found in tropical America.

GOLDEN EAGLE*(Aquila chrysaetos canadensis)*

The golden eagle, one of the most powerful of American birds of prey and a keen and courageous huntsman, is principally an inhabitant of wild and unfrequented areas. From its great expanse of wing it is readily identified. The bald eagle in immature dress is the only bird with which it might be confused, but as these two ordinarily range in different types of country, there is little opportunity to mistake them.

The golden eagle has feathers extending clear to the toes, but in the bald eagle the lower part of the leg is covered with hard scales. This difference serves to distinguish the two in any plumage.

Where prairie dogs are present in large numbers, these are favored food; a pair of eagles will destroy several hundred in the course of a season. At times they turn to sharp-tailed grouse when these are abundant, proving a scourge to the flocks. Jack rabbits, cottontails, marmots, and ground squirrels are killed in large numbers. In winter, when other food is scarce, they may come to dead carcasses, being sometimes hard put in severe weather when the meat is frozen, even with the great strength that they possess in bill and feet.

They also attack lambs and fawns on occasion, and E. S. Cameron records that three golden eagles working together pulled down and killed a pronghorn antelope during severe winter weather when other food was scarce. They will kill and eat coyotes caught in traps, and will also steal the bait when wolf traps are baited with meat. Snakes and wild ducks, and an occasional goose, also may figure in their diet.

Birds and jack rabbits usually are partly plucked before being eaten, but most small mammals are swallowed—skin, hair, and all. These eagles kill many rattlesnakes, being said to feint at them until they uncoil, when the reptiles may be seized without danger.

The lifting powers of this bird have been exaggerated, since it has been claimed that the golden eagle was capable of carrying prey weighing 15 or 20 pounds. Reports from reliable observers, however, indicate a weight of eight pounds as about the maximum which they can carry. When larger prey is killed, it is necessary to eat it on the ground. In the case of geese when they fall in water, the eagle is said to

tow them to land. Frequent reports that these birds have attempted to carry off children are, so far as the experience of naturalists goes, without basis. However, it is interesting to note that these stories are prevalent through the extensive range occupied by golden eagles in both Old and New Worlds.

During most of the year golden eagles are undemonstrative, but in the nesting season they call in shrill, high-pitched tones, and the male often tumbles in the air somewhat like the male marsh hawk. This is accomplished from a high elevation by suddenly closing the wings and dropping headfirst toward the earth, checking the fall just before reaching the ground; then rising again to repeat the performance.

The nest is placed on the ledge of a cliff or is built in a tree. Often it is a large structure, as the birds may use the same site year after year and add to the nest each season. It is built of sticks and limbs, usually with a lining of some softer material, and often is decorated with twigs of green pine. Bendire describes one, from notes made by Denis Gale in Colorado, which was 7 feet high by 6 feet wide, and was said to contain at least two cartloads of material.

Two, or rarely three, eggs are laid, these varying from dull white to pale cream color, with blotches and spots of brown, pearl gray, and lavender. Where there are two eggs in the set, one is usually a little larger than the other. Some believe that the two young constitute a pair, though I know of no certain proof that this holds true.

A TRUE AVIAN ARISTOCRAT

Either from its size or demeanor, the golden eagle gives an impression of intelligence distinctly above that of other birds of prey. As one of our finest forms of wild life, it is to be hoped that the huge bird may hold a place in our fauna for many years.

The golden eagle breeds from northern Alaska and Mackenzie to northern Baja California and central Mexico, and in winter is found south to northern Florida and southern Texas. It formerly nested east of the Mississippi River, and possibly may still do so in North Carolina and Tennessee. Closely allied forms occur in the Eastern Hemisphere.



© National Geographic Society

Approximately one-eighth natural size

GOLDEN EAGLE ✓

Adult on ground, immature flying

Big (♀♀ to 15lbs), rugged, willing, courageous. Dangerous elutchers, & determined responses. ♂♂ handle well; ♀♀ dangerous when keen. Require huge space to fly & work in. A skilled austringer's pride; best as a show bird, in the field or from a lecture platform. Will fly & dead or live luge (a chicken)



© National Geographic Society

Approximately one-tenth natural size

BALD EAGLE

Adult perched, immature flying

An osprey-rabbit, fish-eater & faker. Big as a golden eagle, readily trained & managed, but lacking courage & determination.

A zoo bird lecture platform decorator, nothing else. Requires huge spaces to fly in; will fly a dead lure or a live one (a chicken). The national bird. Poor avstringing bird; much

BALD EAGLE*(Haliaeetus leucocephalus)*

Our national bird, the bald eagle, chosen in the early days of the Union, is figured on many of our coins, is a favored design in matters of patriotic interest, and in general is considered symbolic of our freedom. Its enormous size and the striking markings of the adult make it a prominent species that is noted on every appearance. A bird of great strength and of swift and powerful flight, it is master in its haunts and has no potent enemies except man. Its life is led in the vicinity of water and only casually is it found far from that element.

The food of the bald eagle is mainly fish. In Alaska severe complaint has been made that it destroys salmon during their annual runs up the streams to deposit their eggs. As the salmon cross shallow bars or cascades, leaping from pool to pool, there is no question that many are taken by eagles.

Elsewhere the eagle often fishes by plunging from a height, descending at an angle on its selected prey, sometimes going beneath the surface. Rarely it grapples prey so large that it cannot rise with it and is under necessity of towing it to shore. This eagle also robs the osprey, being fiercely predatory in such encounters.

Large birds are sometimes captured, including ducks, coots, and geese. Although the eagle is sufficiently swift to seize them in flight, it ordinarily gives chase on the water, where it is able to tire them by forcing them to dive until they become exhausted.

Although the bald eagle is said to feed on healthy birds, my own experience with it has been principally that it is constantly in pursuit of birds crippled by shooting or injured in some other way.

During the hunting season I have often seen an eagle swing over rafts of ducks, which it scatters. Then, if cripples appear, they are pursued, and if none is sighted the eagle passes on to other hunting. The taking of such injured birds can hardly be condemned. These eagles have been said on occasion to kill lambs and foxes, the latter furnishing an indication of the birds' strength.

In addition to living food, the bald eagle is prone to search for carrion, following regularly along shores for dead fish cast

up on the beaches, and eating dead animals of other kinds as they offer. Because of this habit, many words of opprobrium have been hurled at it.

There was much discussion before the bald eagle was finally adopted as our Nation's emblem by act of Congress on June 20, 1782; Benjamin Franklin in particular favored the wild turkey. In spite of all that may be said against it, however, it must be conceded that the bald eagle is a bird of fine and noble appearance and that it is a master of the air.

EAGLES GO IN FOR NEST-BUILDING ON A LARGE SCALE

The nests of the bald eagle are large structures of sticks, usually placed in trees, often at a considerable height, though occasionally on cliffs, or even directly on the ground. Nests 5 to 6 feet in diameter and the same in height are not unusual, and nests 12 feet high have been recorded. Herrick found that one near Vermilion, Ohio, was used continuously for thirty-four years.*

Ordinarily two eggs are laid, with occasional sets of three or one. They are white, very rarely with slight markings of buffy brown. Where two eggs are laid, one is nearly always larger than the other. Incubation requires nearly a month, the duty being shared by both parents. The young remain in the nest for about two and a half months, and during that time the old birds are most solicitous of their welfare and safety.

The young bald eagles do not attain the plumage of the adult for three years, and during the first year they are actually larger than their parents.

The southern bald eagle, *Haliaeetus leucocephalus leucocephalus*, nests from the northern United States to Baja California, central Mexico, and Florida. The northern bald eagle, *Haliaeetus leucocephalus alascanus*, breeds from northwestern Alaska and British Columbia to the Great Lakes and Nova Scotia, coming in winter south to Washington, Montana, and Connecticut.

A related species, the gray sea eagle, *Haliaeetus albicilla*, is resident in Greenland, and is found also in Europe and northern Asia.

* See "The Eagle in Action," by Francis H. Herrick, in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1929.

OSPREY

(*Pandion haliaëtus carolinensis*)

Known ordinarily as the "fish hawk," the osprey is found about large bodies of water. Being dependent on fish for food, it never strays far from water except during casual wanderings when in migration. Though it may eat an occasional water snake or frog, practically all of its food is composed of fish, most of which it captures alive.

In fishing, the bird flies slowly from 30 to 100 feet above the water, scanning the surface closely until a fish is sighted, when it turns and drops swiftly, sometimes even going beneath the surface. Rising with its victim held firmly in both feet, the osprey pauses for an instant, supported by broad-spread wings, to shake the water from its plumage; then flies to some perch where its meal may be enjoyed. As it rises, it adjusts its grip so that the fish is carried end on, thus affording a minimum of resistance to the air.

FISH HAWKS ARE NOT EPICUREAN
IN THEIR TASTES

Any fish of proper size that come near the surface are taken. Toadfish are as acceptable as other varieties. Such species as menhaden, which go in large schools, are favorites. In summer on Chesapeake Bay I have seen fish hawks feeding regularly on eels.

The birds have habitual perches to which they carry food, the ground beneath these being strewn with fish bones accumulated from many meals. Where fishermen sort the catch from their nets, I have seen ospreys gather in flocks to pick up discarded dead fish, seizing these from the water or picking them from the sandy beach.

Occasionally ospreys are known to strike fish too large for them to handle, and when their claws become caught the birds are pulled beneath the surface and drowned.

In its fishing the osprey does not always continue unmolested, as the bald eagle, also with an appetite for fish, often resorts to robbery. Watching until an osprey has made its catch, the eagle descends on the fish hawk, in an effort to make it give up its prey, continuing in relentless pursuit with broadly beating wings until the smaller bird drops the booty.

If an osprey is obstinate, the eagle finally strikes, knocking it through the air to make

it release the catch. As the fish falls, the eagle descends swiftly to seize it in the air, or picks it up from the surface of the water. On rare occasions an osprey with a small fish may escape, but ordinarily the bird is so burdened that its flight is hampered to a point where it can make no definite resistance.

Where two eagles combine in this robbery, the case is hopeless, for, wherever the osprey turns, one of the eagles is soon upon it and it can find no avenue of escape. The plate illustrates the beginning of such a scene, with one eagle descending on an osprey that has just made its catch, and another swinging about in the background.

Relieved of its catch, the osprey may strike angrily at the robber, but the larger bird easily wards off such blows with its broad wings. Occasionally, however, the tables are turned, for when ospreys gather in colonies several may band together and harry marauding eagles from the vicinity.

The nest of the osprey ordinarily is a huge structure of sticks, cornstalks, weeds, and other rubbish, placed in the top of a tree, on a rock ledge, on the summit of a pinnacle rock, or occasionally on the roof of a building or chimney. It may also place the nest on the ground.

Frequently grackles, night herons, and English sparrows place their nests in the base of the huge structure occupied by the osprey. The larger bird pays no attention to its smaller neighbors.*

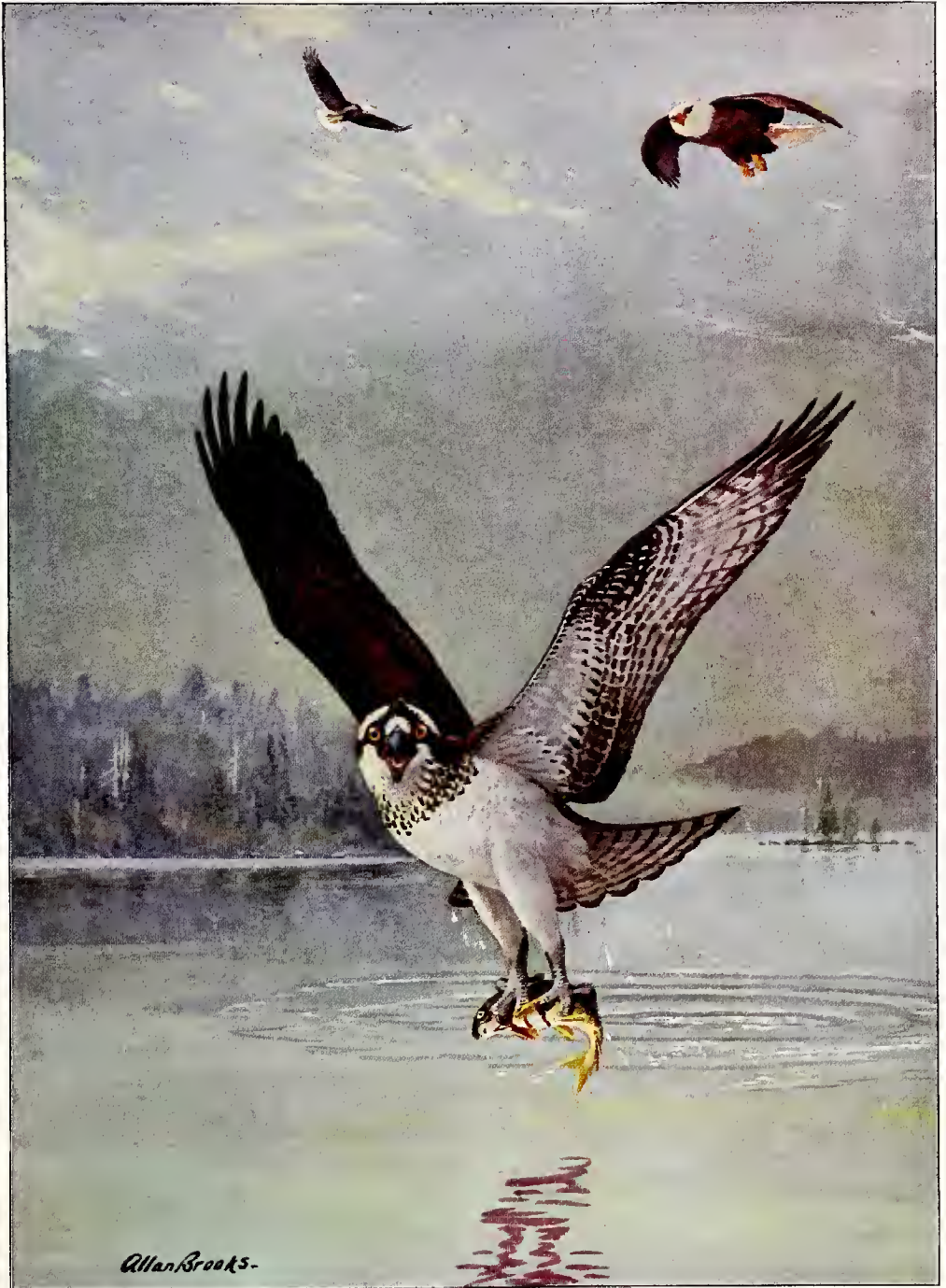
OSPREYS RANGE OVER A LARGE PART OF
THE NEW WORLD

The eggs, from two to four, with three making the usual set, are creamy white, spotted and blotched with brown and lavender. With their rich colors and bold markings, they are among the handsomest eggs found in this order of birds.

The osprey is easily distinguishable at a distance from the eagle and from other hawks by its white breast and long, angular wings.

It breeds from Alaska, Hudson Bay, and Nova Scotia to Baja California and the Florida Keys, wintering from Florida and Baja California to the West Indies and South America. Allied races are found in the Bahamas and in the Old World.

* See "Photographing the Nest Life of the Osprey," by Capt. C. W. R. Knight, in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1932.



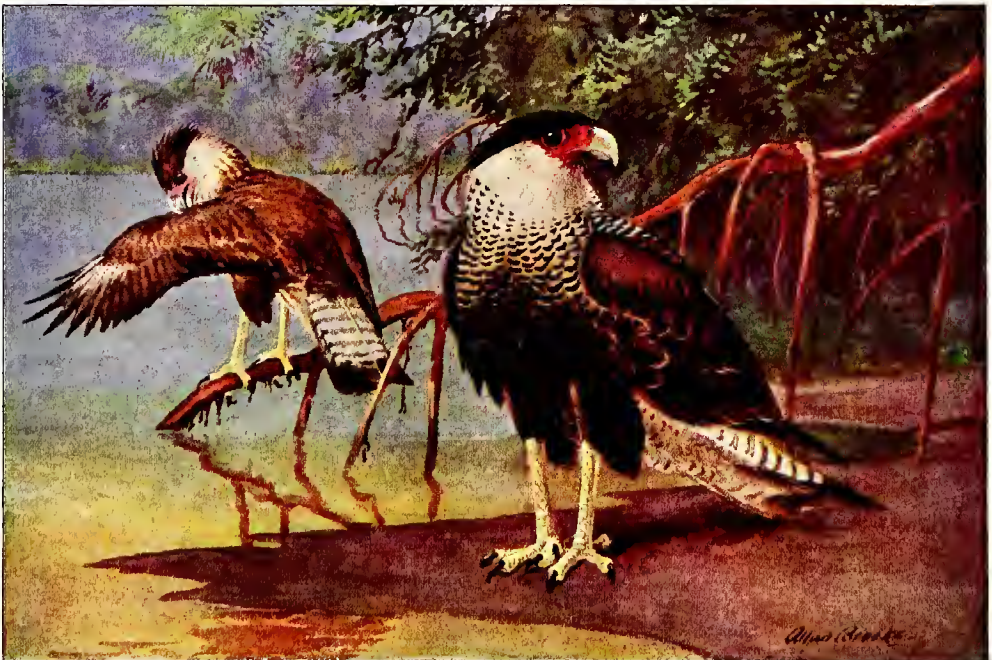
© National Geographic Society

Approximately one-eighth natural size

OSPREY

Two bald eagles flying above

Sluggish, slow, undependable, Fish-eaters.
Manageable, but not worth the effort.
Little real courage or determination



© National Geographic Society

PRAIRIE FALCON

Upper; adult perched,
immature flying

Approximately one-seventh natural size

AUDUBON'S CARACARA

Lower; adult (right),
immature (left)

rate the American Saker. A first
of mucky falcon
valley) coastal cal. prairies (San Joaquin
Wyo. specimens. do a good 1/3 larger than Colo.-
measurements) than peregrines,
will do anything peregrines can
do, but not as well. Good deal of
variation between birds & mammal
killers

A useless cacton feeder

PRAIRIE FALCON ✓

(Falco mexicanus)

This pale-colored falcon has the active, graceful flight of the duck hawk. In a way, it is the arid country representative of that species, but may be distinguished from it by smaller size and paler, sandy coloration.

The nest is placed on a cliff, being often in a recess or small cave, where the eggs are laid on the bare surface, with only whatever rubbish may have accumulated for nesting material. Two to five constitute a complete set, three or four being the customary complement. The ground color of the eggs is creamy white, more or less overlaid with a suffusion of cinnamon, and blotches of reddish brown and chocolate. They are considerably paler than the eggs of the duck hawk.

The prairie falcon feeds on birds of various kinds, blackbirds, horned larks, mourning doves, and others of similar size being favorites. It captures quail and prairie chickens on occasion, and also secures domestic pigeons where flocks of these are found within its range.

I have seen them harry colonies of yellow-headed blackbirds so mercilessly that these unfortunates set up a loud outcry whenever a falcon appeared in the distance. The prairie falcon also feeds on mammals, taking gophers, ground squirrels, and various kinds of rats and mice. In addition, it takes insects, particularly grasshoppers when these are abundant.

In feeding, these hawks sometimes watch from cliffs or open perches in trees until suitable prey appears, or again fly lightly and gracefully along, traveling rather swiftly as they hunt. They have been known to harry marsh hawks and make these birds drop their prey. The falcon seizes its booty in the air as it falls.

About their nesting cliffs these falcons are quite noisy, uttering shrill screams and cackling calls when disturbed. At other seasons they are mainly silent.

The prairie falcon nests from southern British Columbia to Baja California and southern Mexico, extending east to the eastern border of the Great Plains. It is casual in occurrence in Manitoba, Minnesota, and Illinois.

A related species is found in the Southwest, the aplomado falcon (*Falco fusco-coerulescens septentrionalis*).

AUDUBON'S CARACARA

(Polyborus cheriway auduboni)

Although related to the falcons, this peculiar species, often called "Mexican eagle," has many of the habits and mannerisms of vultures. It is found in prairie regions where there are open groves, preferring open country to heavily forested sections. Its flight is straight and rapid, and it sometimes circles high in the air, especially on days of oppressive heat.

In Florida these birds frequently nest in cabbage palmettos; in Texas they occupy mesquites and other trees, and in Arizona giant cacti are sometimes selected. The nests are bulky masses of twigs, weeds, coarse grass, leaves, and Spanish moss, usually piled together in an untidy manner. The eggs number two or three, the ground color being creamy white when it is visible. Most eggs have the entire surface obscured by a wash of cinnamon rufous and blotches of reddish brown.

This bird eats lizards, snakes, frogs, and small turtles, and also takes small mammals. It is fond of rabbits, cotton rats and other mice, and grasshoppers and other large insects. Crabs and crayfish, too, are on its bill of fare.

The caracara is also partial to carrion of all kinds, and frequently comes to carcasses on which vultures are feeding. The caracaras make the larger birds stand aside, as they are strong and aggressive, striking with both bill and feet. On the coast of Texas caracaras have been seen in pursuit of brown pelicans to make them disgorge fish that they had swallowed.

Caracaras are active on the ground, their long legs and relatively short claws enabling them to walk and run with ease. Their voices are peculiar rattling, creaking, screaming calls, in uttering which the birds frequently throw the head backward until it touches the back.

On Guadalupe Island, Mexico, off the western coast of Baja California, there was formerly found the Guadalupe caracara, *Polyborus lutosus*. The last of this species was recorded about 1905.

Audubon's caracara nests from northern Baja California, southwestern Arizona, central and southern Florida, and Cuba south through Mexico and Central America. It has been recorded accidentally in Ontario. An allied race occurs in northern South America.

~~Peregrine~~
~~Duck Hawk~~

(*Falco peregrinus anatum*)

The duck hawk, finest of the falcons of our continent, lives in regions where cliffs furnish it aeries. Truly a master of the air, it kills at will, and its food is composed almost entirely of birds.

Resting on a commanding perch or flying easily, the hawk, when its appetite is aroused by some luckless bird, descends with a rush of wings so swiftly as almost to elude sight, and strikes its unfortunate victim like a veritable thunderbolt. Ducks, shore birds, robins, meadowlarks, flickers, pheasants, grouse, pigeons, and many others have been recorded as its victims.

When it has tiny young, it obtains warblers, sparrows, and other small birds to feed them. No form of bird is safe from it, as it has been known even to capture the agile chimney swift. A duck hawk comes nearly every winter to the old Post Office Department tower in Washington, and lives on pigeons captured as they fly over the grounds of the Smithsonian Institution or above the near-by buildings. Mammals are seldom taken.

The duck hawk usually places its nest on a cliff, often in a spot where it is practically inaccessible. Occasionally it resorts to large hollows in trees, or very rarely to old nests of eagles or hawks. The only nesting material consists of whatever rubbish may have accumulated on the chosen site, this usually including bones and other fragments from birds the duck hawk has eaten.

Three to five eggs are laid, four being the usual number. These are creamy or yellowish white, irregularly blotched, streaked, or otherwise heavily marked with various shades of bright brown.

The parents are noisy during the breeding season, uttering quick, cackling calls. When their nests are approached, they circle rapidly about, harrying unmercifully other birds that chance to pass, and even killing ruthlessly when enraged.

The duck hawk nests from Alaska and the west coast of central Greenland to Baja California, Kansas, and Maryland. In winter it ranges south to Panama. Peale's falcon, *Falco peregrinus pealei*, a darker race, nests on the Aleutian and Commander Islands, coming south in winter to Oregon. Allied races are found in the other continents of the world.

GYRFALCON

(*Falco rusticolus*)

This hunting falcon of the north in early days was the type most prized by the devotees of the sport of falconry. Swift in flight and possessed of almost endless endurance, these birds were desired above all other hunting hawks.

They range far beyond the limits of tree growth, apparently to the limits of land. They become so accustomed to resting on the ground or on rocks that in captivity they actually seem to prefer such locations to a perch.

The gyrfalcons of North America appear to like birds better than other food, capturing them ordinarily on the wing. In the far north they often nest in the vicinity of colonies of auks, great piles of whose bones accumulate beneath the gyrfalcon homes.

From Labrador to Alaska these falcons are the scourge of the ptarmigan. They also capture gulls, guillemots, shore birds of various kinds, and snow buntings, as well as lemmings and Arctic hares. On St. George Island, one of the Pribilof group in Bering Sea, Hanna records that one winter gyrfalcons came in abundance and nearly exterminated the little wren and the rosy finches.

The gyrfalcon nests on ledges on the face of cliffs, placing its eggs on accumulations of its own pellets, or, where there is woody vegetation, it sometimes occupies nests of sticks. The eggs, usually three or four, are creamy white, very heavily marked with reddish brown, and are among the most handsome eggs of their group. Nesting may come in May in the far north, so that the nests are frequently hung with icicles.

The races of gyrfalcons found in North America are in some confusion because of the considerable variation in color among these birds. In Greenland there is found the white gyrfalcon, *Falco rusticolus candicans*, which also has a dark phase in which the plumage is mainly gray. This race may breed also in eastern Arctic America, and is casual in winter south to British Columbia, Montana, and Maine. A darker form, varying from gray to nearly black, known as the black gyrfalcon, *Falco rusticolus obsoletus*, nests from Point Barrow to Labrador, and in winter ranges south into the northern United States.

EAGLES, HAWKS, AND VULTURES



© National Geographic Society

Approximately one-seventh natural size

Peregrine
(DUCK HAWK)
The falconers' falcon
Upper; adults (left), three young (right)

WHITE GYRFALCON
Young

BLACK GYRFALCON

When obtained in good feather and condition and managed to prevent Aspergillosis (to which they are quite readily subject) and flown in wide open spaces these falcons, white, grey, or black (but especially the grey) are just as good as, or better than, the peregrine. They require much open space, are very fast at wing & steady



© National Geographic Society
American Kestrel
 (SPARROW HAWK)

Upper; male (right),
 female in nesting hole

Approximately one-sixth natural size
American Merlin
 (FALCON HAWK)

Lower; adult male (right),
 immature female (left)

man Beautiful & rugged & common before D.D.
 It can take tippler pigeons
 Make fine substitutes for
 shrakes at bow-net set-ups
 Sure to be lost if slow
 when grasshoppers are flying (es-
 pecially *Dissosteira carolina* the XVII
 big black & yellow winged locust.

A miniature ger with all the
 many virtues thereof. One fault, -
 a tendency to carry
 and small and therefore delicate
 difficult to manage
 A falconer's falcon

American Kestrel
~~(SPARROW HAWK)~~
 (Falco sparverius)

The handsome sparrow hawk, most familiar of American falcons, has adapted itself readily to the changes brought by our civilization, being so evidently harmless that it has escaped much of the destruction aimed universally at its larger companions. It is equally at home in the diverse environments found between the green pasture lands of the east and the arid cactus forests of Baja California.

The sparrow hawk feeds principally on mice, large insects, lizards, and frogs. On occasion it attacks birds, and may kill quail, jays, or other birds as large and heavy as itself. About cities it destroys many English sparrows and starlings.

Often it hovers in the air with rapidly beating wings, intently watching the grass below until a mouse or other prey comes far enough out in the open to be caught.

CITY LIFE SEEMS TO AGREE WITH THE
 SPARROW HAWK

The sparrow hawk nests in cavities, old nesting holes of the flicker or other large woodpeckers being favorite shelters, and has come to occupy bird boxes about houses. It frequently lives in cities, and in Washington is found about the roofs of the Smithsonian buildings. The number of eggs in a set ranges from three to seven. They vary in ground color from white to cream and cinnamon buff, spotted and blotched with brown.

The call of this hawk is a rapidly repeated *killy killy killy*, from which it is often known as "killy hawk."

The eastern sparrow hawk (*Falco sparverius sparverius*) nests from the upper Yukon, southern Quebec, and Nova Scotia to northwestern California, eastern Texas, and northern Alabama.

The desert sparrow hawk (*Falco s. phalaena*), which is somewhat larger and paler, breeds from southern New Mexico and southern California south into Mexico.

The San Lucas sparrow hawk (*Falco s. peninsularis*), smaller in size, is found in southern Baja California, and the little sparrow hawk (*Falco s. paulus*), also of small size but darker in color, resides in Florida and the Gulf coast region.

Allied races range through the West Indies and Central and South America.

American Merlin
~~(PIGEON HAWK)~~
 (Falco columbarius)

The pigeon hawk derives its name from its curious resemblance to a pigeon in certain attitudes, or in mannerisms of flight that it may assume, though at other times it is obviously and unmistakably a falcon.

It is found in wooded areas or in semi-open country, depending upon where its search for food may take it. It is a bird of swift and graceful flight and travels at high speed with little apparent effort.

Like related falcons, the pigeon hawk feeds extensively on birds. Its speed of flight and its strength are attested by its capture of swallows and even of the chimney swift, and its killing of meadowlarks, flickers, and small doves. Mice are taken occasionally and large insects more frequently.

When not hungry, this active little hawk delights in chasing birds merely to display its mastery, threatening but not actually harming them. Jays and crows may be the butts of this sport, or again the hawk may pursue flocks of sandpipers. When in search of a meal, its whole action changes and it kills speedily and ruthlessly.

The pigeon hawk builds a nest of twigs and bark lined with softer materials, and places it in a tree, often only a few feet above the ground, on a rock ledge, or occasionally in a hollow tree. Four or five eggs constitute a set, being pale creamy white, with a wash of reddish brown and spots and blotches of deep brown. About the nest the birds utter piercing cries and chattering, scolding notes.

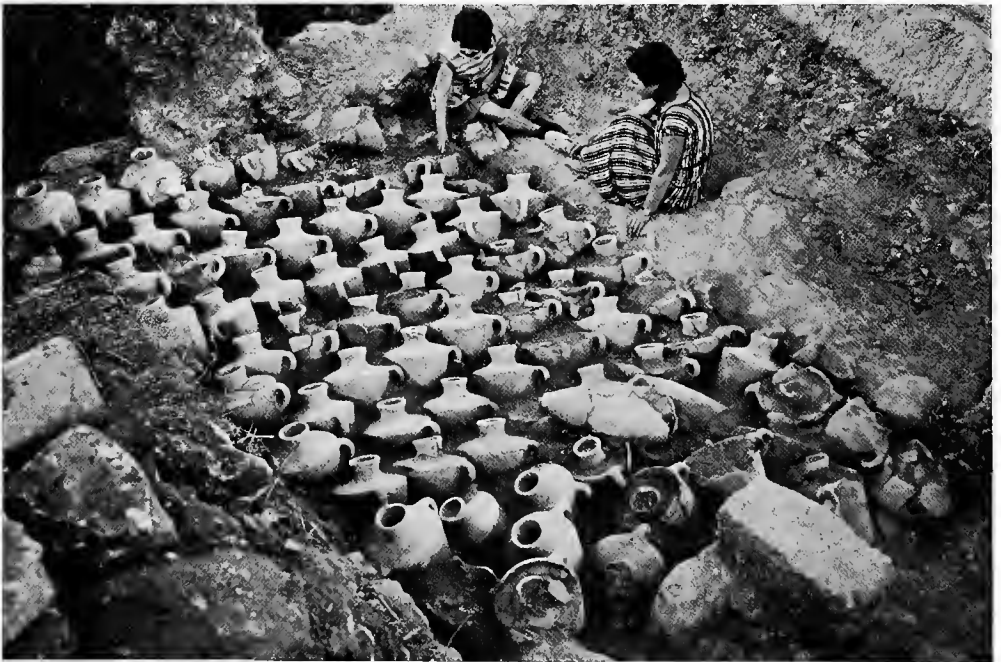
The eastern pigeon hawk (*Falco columbarius columbarius*) nests from eastern Canada to Maine and Manitoba, migrating in winter to the Gulf States and northern South America.

The black pigeon hawk (*Falco c. suckleyi*), blackish brown in color, nests in western British Columbia, wintering in the coastal region south to northern California. Richardson's pigeon hawk (*Falco c. richardsoni*), lighter in color than the ordinary form, is found from Alberta and Saskatchewan to Montana and North Dakota, wintering from Colorado to northwestern Mexico.

The western pigeon hawk (*Falco c. ben-direi*), darker than Richardson's, breeds from northwestern Alaska to California, in winter ranging to Mexico.



GIGANTIC STONES WHICH HAD BEEN PLACED AS COVERS OVER MANY TOMBS AT RAS SHAMRA PROVED SERIOUS OBSTACLES TO THE EXCAVATORS



MORE THAN 3,300 YEARS AGO THESE JUGS OF WINE AND OIL WERE BURIED WITH A SYRIAN KING FOR HIS USE IN ANOTHER WORLD

fresher. However, they still concerned *mariners'* weather. Nautical observers are not equipped or trained to give information exactly as *flyers* wish it. What does a sailor care about the height of clouds or how the winds blow at 10,000 feet?

The meteorological assistance rendered me on the Pacific flight indicated the accuracy that can be attained in the science with trained personnel and a new theory of forecasting.

In Honolulu I was fortunate in obtaining the cooperation of Lieutenant E. W. Stephens, U. S. Navy, aerological officer at Pearl Harbor. Lieutenant Stephens, who was responsible for plotting the weather for the Navy's successful flight to Hawaii a year previously, worked with us early and late. Ten days before the take-off he constructed a hypothetical weather map embracing much of the Pacific Ocean and western America. That chart—a thing of highs and lows, swirling isobars, barometer and temperature readings, wind directions and velocities—he made as he felt it *should be when I started*.

Then we waited for the gods of weather to adjust their caprices throughout this far-flung territory so that their handiwork would at least approximately match our ideal.

FRIDAY THE GOOD WEATHER DAY

After digesting the data that came in by radio from vessels, from tiny islands scattered eastward of Hawaii, from Pacific-coast stations, Lieutenant Stephens on Wednesday remarked: "It looks like Friday. I think things will work out by then."

They did. And because of his satisfaction with the outlook when Friday came, I decided to start, even though that was against advice received from California. The consoling fact is that I found conditions substantially as predicted by Lieutenant Stephens, even on the California coast.

Just now much attention is being directed to the pending possibilities of airlines operating across the Pacific. Momentarily the center of interest has shifted from the Atlantic. But over whatever ocean scheduled air transport may pioneer, a vital factor in its establishment will be the development of meteorological data. With what we now know about weather and with the in-

stant communication of radio, it is not at all impossible, with proper preparation, to command a picture of upper-air conditions prevailing at any given hour over even extended routes. One can also forecast what will "come in" during the time elapsed in the making of a flight.

FLYING THE ATLANTIC AND THE PACIFIC

The western frontier of the United States lies 2,400 miles from the mainland. Though this stretch of water is several hundred miles greater than the shortest land-to-land distance of the North Atlantic, it probably presents less formidable hazards for the flyer. Of course, no definite statements on this score can be made until after considerable research on weather and more actual flight data are recorded. Further, what is applicable to an individual flight such as mine does not necessarily hold true for transport operation.

For general comparisons North Atlantic and mid-Pacific weather disturbances are similarly severe at times, but probably ice-formation danger is greater over the Atlantic. The shortest course from America to Europe, followed by most flyers so far, has been somewhat north of the normal steamer lanes. From Honolulu to San Francisco or Los Angeles the route lies directly over that traversed by ships—a definite advantage.

To me it seems that regular air transport across both oceans is inevitable, and will probably come about sooner than most people suspect.

Probably used in such long-range service will be the new radio compasses. These are extraordinary "gadgets," which actually lead a pilot to a selected point, guided by radio operating at that destination.

This uncanny "homing" device is gradually emerging from the realms of experimentation into that of proved practicality. One, the Kruesi compass, after Army testing ashore, has recently been tried out over the Pacific in flights instigated by Eugene L. Vidal, Director of Air Commerce.

Another variety of the new instrument, the Lear compass, is being installed in my own plane. With this latest addition to my already generously populated instrument board, I anticipate instructive experience in this most modern means of finding one's way in the air.



ON LAKE OR CRAGGY SEACOAST MAY DWELL A BOLD WORLD WANDERER

Here on the Monterey cliffs above the foaming Pacific lived a family of duck hawks, American form of the peregrine (meaning "alien" or "wandering") falcon. Its cousins were the noble birds of falconry's heyday in old England. Another relative, the prairie falcon, a lover of mountain ranges and arid plains, is the American representative of the ~~hawk~~ ^{sovereign}, a desert falcon flown in olden times by Oriental potentates.

WEEK-ENDS WITH THE PRAIRIE FALCON

A Commuter Finds Recreation in Scaling Cliffs to Observe the Nest Life and Flying Habits of These Elusive Birds

BY FREDERICK HALL FOWLER

With Illustrations from Photographs by the Author

TWELVE times a year I present myself before the ticket window of our local railroad station in California, slide through the necessary coin, and cry: "Without!"

Back through the window comes a monthly commutation ticket to the distant city—"without" Sundays. Sundays are mine to do with as I will, and for several years I have willed to spend them far afield.

Formerly Sundays and the latter halves of Saturdays had shown a growing tendency to get mixed up with all the other days—days on which with ceaseless care I pursued my interesting but exacting profession of civil engineer, computing with endless labor the stresses in dams and beams, the yield of rivers, and the peaks of floods.

"Without!" was fast losing all significance. A change was imperative, and that change took me back to an interest of my not-too-distant youth—the pursuit of birds.

Before long I was renewing my acquaintance with that interesting bird, the prairie falcon,* in the canyons extending eastward in the Coast Ranges and opening into the northern San Joaquin Valley.

Let me introduce him as he presented himself to me one breezy day when I was making my way along the base of a nesting crag (see page 622).

Suddenly the male swept over the crest, saw me, gave a prolonged scream, and started upward. He did not spiral up in long circles, as these birds usually do, but in short loops and at as steep a pitch as his wildest efforts would permit.

Up, up he went, with an occasional breathless scream, until he was fully 300 feet above me and probably half again that distance down wind. With a few last upward-reaching wing strokes he attained his pitch and balanced for a moment to turn toward me.

* See "Eagles, Hawks, and Vultures," by Alexander Wetmore, with 30 portraits in colors by Allan Brooks, NATIONAL GEOGRAPHIC MAGAZINE, July, 1933.

Then, with a few more strong wing-beats, he started down like a stone from a sling. Once on his way, he closed his wings until they were not more than one-quarter open and held as motionless as the vanes on an arrow. His tail, also, contrary to the ideas of many bird artists, was closed nearly to a point. His head, with beak pointing straight at me, was in such a position that I could note perfectly the dark markings, or "moustaching," so characteristic of the falcons.

One hundred feet above me, sensing that his aim was perfect, he closed both wings completely and came like a bullet.

At 30 feet I forgot all I had ever learned of a falcon never striking a man, and ducked. At the same moment he opened his wings very slightly, set his rudder upward, and whizzed by, not more than ten feet above my head. His speed upward appeared nearly as fast as during his descent, although at first he did not fly a stroke.

When the momentum of his swoop had expended itself, he fought his way upward as before and came at me again, this time down wind.

It was a wonderful opportunity to observe just how a falcon must look to a fleeing meadowlark that gives one last glance over its shoulder before the fatal stroke.

PHOTOGRAPHING A BIRD'S HOME LIFE

With a still and a movie camera, instead of the gun of my earlier years, I stalked the prairie falcon. Finally I set out to watch and record the nest life from the laying of the eggs until the young take wing.

It soon became evident, however, why the falcon's eggs are a prize of the collector. Two years passed before I found a nest within a reasonable distance of my home that was not robbed within a week after the eggs were laid.

This "nest on the cliff," as it came to be known in our pilgrimages, was high on a sandstone ledge in the head of a small canyon near the top of a ridge—a region of mountain pastures nearly 2,000 feet above



A SIX-FOOTER CAN VISIT THESE FALCONS ONLY IN A PRAYERFUL POSE

"This hurts me more than you," the author may truthfully remark to the young ones visible on the ledge. At the cost of barked shins and bumps on the head he climbed up each week, gently lifted the youngsters into a box, and took them to the base of the cliff to be weighed and photographed for science (see illustration, opposite page).

sea level (see page 617). The two previous years the eggs had been stolen by "party or parties unknown," and the falcons, without laying a second time, had frequented the various cliffs in the neighborhood for the rest of each summer and well into the fall. This time, although the day was April 1, we were not fooled.

Our sudden appearance over the crest of the ridge was greeted by a slight movement on the ledge and a long and angry scream. There, across the canyon, but not 50 yards away and almost level with us, was the falcon, rising slowly from its eggs and screaming an angry protest. Running a few steps, she launched out from the edge of the ledge and circled above us, screaming. Once or twice she set sail, as if to return to the nest, but changed her mind and remained on the wing.

AT LAST—THE REDDISH EGGS!

At least four reddish-brown eggs lying in a shallow depression in the sand and small fragments of rock at one end of the main ledge could be seen through the field glasses.

Their rich coloring reminded me of the description once given by a small boy I had lowered over a bluff to report on the contents of another falcon's nest.

"Four eggs," he called.

"What color?" I asked.

"Gee, I don't know!" Then, after a moment's pause, "Just the color that makes you want to reach out and grab them!"

Even the protracted screaming and high flying of the female had not brought back the male, who was probably absent on some distant hunt; but when the cliff was revisited in the afternoon he appeared quickly in answer to her short alarm cry, and circled and screamed overhead at a great rate.

He was overburdened with a tremendously full crop, however. This made him look like a pouter pigeon, shortened his breath, and forced him to rest on the dead limb of an oak tree down the canyon. The perch, we found, was one of two favorite lookouts used by both birds.

We were back at the cliff with rope and camera less than a week later (April 7). This time the old bird stuck to her nest like a setting hen, while we scrambled around on



JUST TWO AND A HALF OUNCES OF SLEEPY FALCON

Here at the tender age of three days he could keep his eyes open for only a moment. He frequently lost his balance and curled up as if still in the shell while tape and camera were recording his size (see illustration, opposite page). But all at once he began to grow amazingly, doubling his weight in the next four days. In 24 days an enormous appetite had boosted the figure to 20 ounces, an increase of 700 per cent!

the cliff 15 feet above her head and drove in a steel pin to anchor the rope. She finally decided to leave, however, when the loose end of the rope was thrown down the face of the cliff just in front of her.

One who has long since arrived at years of discretion, weighs 200, and is not particularly fond of high places takes no chances. My anchor pin was a stout three-foot length of drill steel, and to it was attached not only a "hand line," which I firmly grasped, but a "bosun's chair," in which I sat while being lowered straight down ten feet to the edge of the ledge. On the upward journey I would dig my toes into the cracks in the rocks, climb the hand line until my breath gave out, and with the last gasp yell to those above to haul in on the bosun's chair.

Gaining the first foothold on the end of the nesting ledge was always a precarious feat, since the rock above overhung slightly. By balancing a moment, however, and getting a little slack in both lines, it was easy to swing under, and then everything was safe, comfortable, and cosy.

As soon as I had time to get a firm foot-

ing and look around, I found the nest contained five instead of four eggs—and they were beauties (see illustration, page 614).

I could have remained indefinitely, seated comfortably on that sandy ledge, high up the cliff, admiring both the beautiful markings of the eggs and the view spread below me; but the anxious cries of the parents from cliff and tree and the fear of their deserting the nest sent me scrambling back up the cliff and away.

The next week-end found me sneaking up behind the sheltering ridge in fear and trembling lest the egg collector on whose bailiwick I was trespassing had been there in my absence.

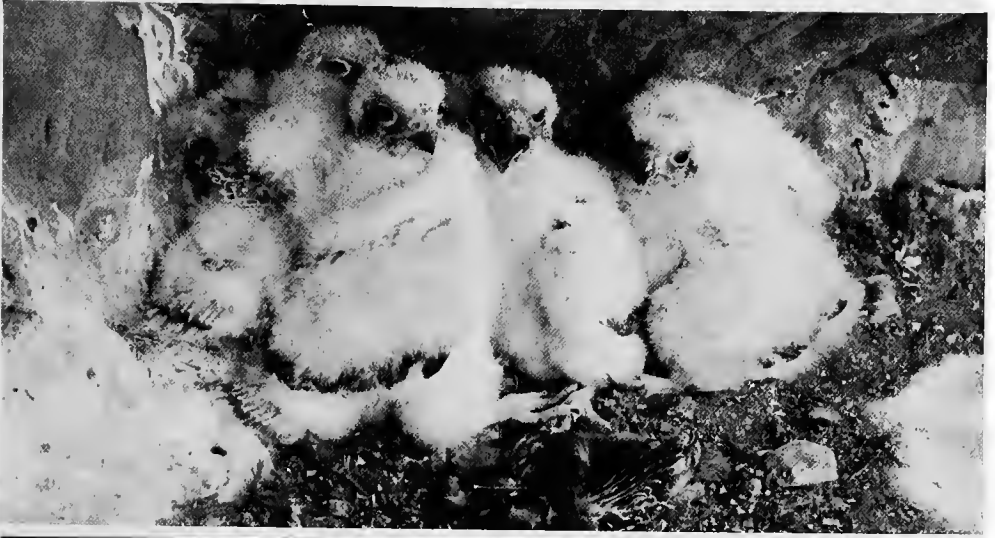
But luck was still with me. The female was on the eggs, sat tight, and let me take a half-hidden seat under a scraggly oak. She was very nervous at first, but betrayed it only by keeping her head well up, like a poorly made wooden decoy, and turning a watchful eye not only on me, but on everything far or near that looked suspicious.

As her fear wore off, she lowered her head between her shoulders, but did not at any



FIVE LITTLE FALCONS AND HOW THEY GREW—

On a high cliff ledge were laid the eggs, creamy white and heavily marked with chestnut and cinnamon—"just the color that makes you want to reach out and grab them," as a small boy put it. Next appear the downy "quintuplets," nine days old, uttering yawns and faint whistling peeps. At 16 days, four of the five seem too drowsy to hold up their heads. The prairie falcon does not construct a nest, but frequently pirates the stick home of a raven or some other bird of prey.



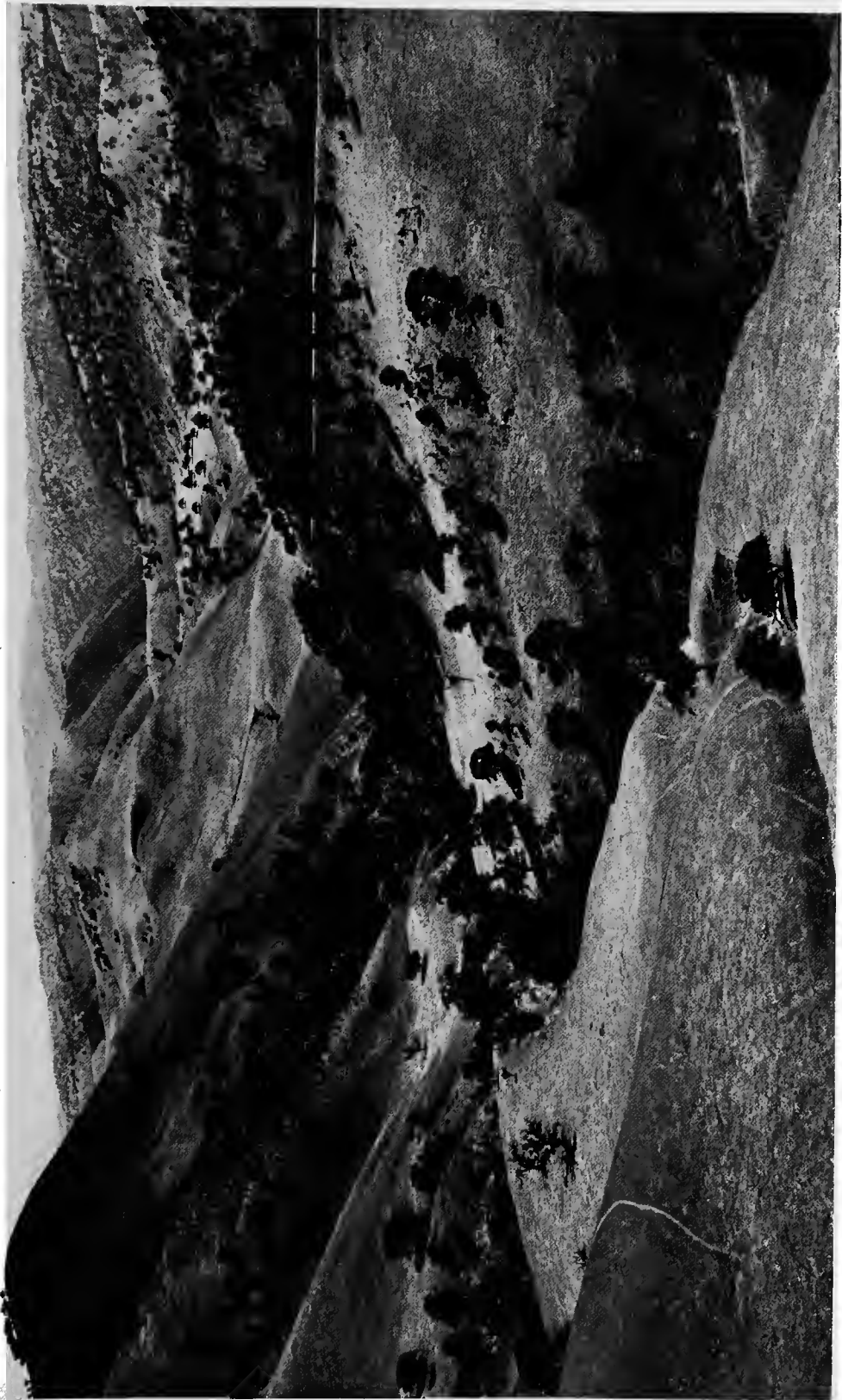
—FROM EGG TO INDEPENDENCE IN 33 DAYS

In their snowy fleece coats, the 23-day old youngsters (top) rest after a meal of meadowlark. As if ashamed of such a banquet, one hides under the pile. A week later feather growth is well started and they wander to a far corner of the ledge. At 33 days old and nearly ready to leave the nest, they pose for a last close-up (below)—first, peevish "Blackie"; then aggressive "Red"; good-tempered "Green"; solemn "Blue," and "White," just outside the picture (see text, page 621).



NATURE SCOURS DEEP POTHOLES IN A SKULL-LIKE ROCK TO MAKE A BIRD APARTMENT HOUSE

A pair of prairie falcons once lived in a hollow just above the large niche at the left, but they went house-hunting elsewhere when a dance hall and frequent picnic parties in this region north of Altamont, California, destroyed the solitude they demand. In the opposite side of the grotesque, grayish-brown rock is a second large niche in which stands the tomb of an old-time rancher.



ABOVE THESE HAPPY HUNTING GROUNDS PRAIRIE FALCONS WHEEL AND SWOOP

Hungry nestlings on the cliff ledge from which the picture was taken gazed out over the tree-dotted ridges of California's Coast Ranges, watching for their parents to return with tempting ground squirrels or meadowlarks (see illustrations, pages 614 and 615). A pair of golden eagles dwelt in the oaks on the peak at the left and sailed in wide circles high above it. When they swung too close to the falcons' eyrie, they were greeted by angry screams from the latter and then by a marvelous diving aerial attack which made the eagles shift their course.

time let it hang forward with beak down. Bluebottle flies, attracted to the nest by scraps of meat left by the falcons, were flecked off her head and beak with a quick twitch.

THE WATCH ON THE LEDGE

An hour and five minutes by the clock I watched, and then the male sailed in, without a sound from either bird to announce his coming, and alighted on the ledge about five feet from the female's head. For a few moments after his arrival he uttered low and not unmusical screams and stood with head hung straight down, looking at his feet—a pose more common with the Cooper's hawk than with a falcon.

After a few moments he ran quickly along the edge of the ledge to the side of the brooding female, who had not yet recognized his presence by movement or call. The moment he arrived, however, she suddenly half-raised, with lower feathers still puffed out, ran quickly out along the ledge, and sailed away without uttering a sound.

The male looked the eggs over and started to settle himself upon them in her place, but his smaller size made it more difficult to cover them and the operation appeared to worry him. He hunched and shuffled around carefully, but uncomfortably, and finally tucked two eggs under his breast feathers by nudging them along with his beak.

Once fairly settled on the eggs, his anxiety did not seem to end, and he humped himself up and buckled down to his task as if the eggs had been on springs and might shoot out from under him if he relaxed his efforts for a moment.

Within five minutes of getting settled, he suddenly jumped up and sailed off the ledge without a run. I think his scare was due to noticing me for the first time, for no other intruder had approached.

SLEEP OVERTAKES THE NEST SENTINEL

After perching near by and cackling half-heartedly, he finally returned and settled on the eggs as laboriously as before. He wanted to be wild and wary, but times were too dull. He became sleeper and sleeper and finally dozed off completely. From time to time he awoke to flick flies off his beak, but only once in four hours did he move his body.

Finally the sun began to strike the spot, and after 1 p. m. he kept a sharp lookout

for his mate. When she sailed in, about 2:35, he awaited no formalities, but immediately jumped from the eggs into full flight.

The female looked at me and cackled hoarsely, but soon settled herself on the eggs with little of the difficulty and discomfort her spouse had experienced.

Soon after, I uncoiled my cramped legs and called it a day. Five and a half hours of steady watching, much of it through field glasses, had been repaid by an interesting glimpse into the division of labor in a falcon family (see illustrations, page 620).

Further observation was delayed for two weeks by a trip east, and when I slid down the rope to the ledge on April 29 I found five amiable young falcons huddled into a single mass of white down, from which heads, legs, and wings protruded indiscriminately (see pages 614 and 615).

The covering of down was scant enough, so that their very pink skins showed plainly through it. One or two of them sat up from time to time and preened themselves. They indulged, too, in many yawns and gave faint whistling peeps.

Between swoops in front of the cliff the old birds sat in dead trees or on the face of the bluff and yelled their disapproval of me.

"BABY SCALES"—FOR YOUNG BIRDS

A strong breeze was blowing from the northwest on the afternoon of May 2, when we again visited the cliff, and the male was standing by the nest with his back to the wind, screening the young. On our approach he sailed off to his own particular lookout down the canyon; as I went over the top the female appeared and both began the usual circling and cackling.

The youngsters showed very marked growth, had far more down and far less pink showing through, and were much more alert than on my visit three days before. The chalky-white knob, or "egg tooth," on the end of the bill was nearly gone.

For identification, I first tried clipping the extreme tip of one claw; but this proved somewhat unsatisfactory because of the growth and wear, so I marked the five with colored strings. With these as guides, a separate weight record was started that continued for the rest of their nest lives, much to the annoyance of the entire family.

By the time the ceremonies for the day were over, the young seemed both bored



AMONG FALCONS THE FEMALE IS BULKIER THAN THE MALE

Loud screams from the base of the cliff instead of from the nest greeted the author one morning when the youngsters were about 37 days old. All had left the home ledge at the blind and the most enterprising one departed up the canyon when approached, leaving his nest mates for a few final poses.

and chilly and were trying to huddle under the scales—a poor source of warmth and comfort.

Longing for a series of pictures of the young and parents together, but lacking a telephoto lens, I recalled the inventive Private Jones (familiar to the lovers of Bruce Bairnsfather's wartime drawings), who constructed "Little Plugstreet, The Sniper's Friend," a camouflaged sheet-iron tree trunk. Within it the inventor passed a hair-raising morning, overtaken by daylight and under heavy fire while bogged down in a Belgian turnip field.

Our "Little Plugstreet" was a chunk of concrete cast around two boxes set side by

side—one large enough to contain a nine-by-twelve-centimeter still camera with a very fine but short-focus lens, and the other a small moving-picture machine.

With much tugging and puffing, we lugged this heavy contraption to the top of the cliff and swung it down to the ledge on the quiet morning of May 6, while both parents circled and screamed.

Arrival of this large freight shipment on the ledge had the young well bluffed. When I came to interview them they were all backed up against the wall in a "sell your lives dearly, boys," pose, and they opened their mouths in unison every time I made a sudden move.



FLASHES OF A FALCON FAMILY

Mother at the top tucks in her babies, covering them with her warm breast. Just below, father glances around with an air of vigilance before sheltering the young in his turn. Next, he gently feeds the weak, eight-day-old youngsters. At the bottom he loafs. Later the parents are in an endless rush to obtain food for their offspring.

This fright soon wore off, however. The youngsters decided that the one being marked and weighed was also being fed, and all crowded forward to get their share.

FALCONS UNDISTURBED BY "PLUGSTREET"

When finally set in place, Plugstreet faced the nestlings at a distance of six feet; but, although about the size of a cracker box, it did not appear to us greatly out of place against the gray sandstone of the ledge. Whether the old and wary falcons would view it in the same light was another question.

As we anxiously watched from a distance, we were delighted to see them both sail in and alight almost on top of Plugstreet without giving this new addition to their furniture the slightest attention.

After a few moments they both sailed out, circled twice, and then the female, returning to the ledge, scuttled over to the young. They had long been milling around, hungry and chilly, and were happy enough when she gathered them under her. It was interesting to note that she seemed more anxious to warm them than to feed them.

On my arrival on May 9 the young were much more warlike and had developed more than during any period so far. The two on the outside of the pile—on the side toward me—were suspicious and full of fight, a third was screened by their bodies and hence neutral, while a fourth was completely buried under the pile and did not seem to know that I was around until I finally dragged him out for weighing. The surprise was too much for his disposition, which, by the way, early in life developed a set toward peevishness. He yelled all during weighing, while he was hobbling back to the nest, and then turned and kept on cursing me.

As a gentle introduction to the sounds which might be heard the next week-end, a fully wound alarm clock was concealed in the rocks just in front of Plugstreet. Steadily ticking, it made a noise not far different from the well-muffled whir of a movie motor; also, the trip lines for the two cameras were strung from the ledge to a brown canvas blind under an oak across the gully.

"Up and at 'em!" was the slogan on the following Sunday morning. It was May 13, and before 9 we were on the ledge and attaching the camera lines, to the tune of angry screams and hoarse cackling of the parents.

Plugstreet was so located that to sight the camera I had to kneel in front of it, leaning over as if praying to Mecca. While I was in this devotional attitude, with the camera pointed back between my legs, a trial pull on the line started the movie machine. The result was 20 feet of film that shows a puzzled group of young falcons framed between and half hidden by a pair of abnormally large boot heels.

Shortly before 11, however, the lines were successfully adjusted and I crawled into the blind across the gulch.

A LONG WAIT IS REWARDED

For an hour and a half there were no developments. It was hot and flies buzzed sleepily. Ten minutes more and I would have been sound asleep; but precisely at 12:25 the male sailed in past the front of the cliff and screamed musically, but did not land. His approach brought a loud chorus of appeals from the cliff, but they gradually died away as he departed. In five minutes he was back, and lit near the nest to look things over. The young were placing breakfast orders at a great rate, and just as I was about to spring one of the cameras he went off again.

At 12:55 he reappeared and, with a few screams to announce the meal, lit on the ledge. He had a meadowlark and, scuttling up to a point between Plugstreet and the young, was promptly surrounded by the whole yelling mob.

When they continued their eager crowding, he picked up the game in his beak, dodged back, holding it as high as he could reach, and ran in a half circle around the group to the nest. During this circuit he looked like a pouter pigeon in action. They swarmed about him again, and he had to step lively to avoid being tramped on by his vigorous family.

BLACKIE'S CHARACTER WARRANTS HIS NAME

My tugging at the camera lines finally parted them, and a loose end, whipped in front of the ledge, sent the watchful bird into the air in an instant. Inspection showed that the regular camera had not gone off, due to the line fouling on a point of rock, but that the movie had nearly run down.

The young, which by this time were familiarly known by the colors of their respective bands, hissed as usual and for the

first time clawed at me ineffectively when I caught them for weighing. Blue was the tamest, Red nearly departed around the corner to the farther extension of the ledge, and Blackie, who on my preceding visit had been found on the bottom of the pile and had shown an evil temper, now yelled vociferously, again displaying the mean character that was his outstanding trait in all the time I knew him.

By May 16 life on the ledge had changed radically. Instead of huddling together, the young were wandering about. Out on the extreme end of the shelf, seven or eight feet from the nest, was Blackie, who had adjourned from the main party with a meadowlark's wing, which he was industriously picking. The remains of one or more ground squirrels were scattered about and all the young were "full to the eyes."

Blackie, gathered in with a butterfly net, was deposited in a black bag that I hoped would quiet the birds during weighing. When placed on the scale platform, however, he did a war dance and considerable time passed before quiet was restored.

ALWAYS HOPING FOR A MEAL

To say they hated that butterfly net was putting it mildly; but, after each one was weighed in turn, they stood around at my elbow and "watched the other boys get theirs." Hope still sprung eternal in their downy breasts that some time I would produce a ground squirrel or meadowlark, and then a general feed would be in order.

The young found their voices for the first time for other uses than calling for food, and tried to answer back the old ones, as they cursed us from the cliff and tree.

As I was weighing the youngsters a gopher snake came gliding along the rock just below the edge of the shelf, and I rolled him over down into the brush at the bottom, where he would do no harm.

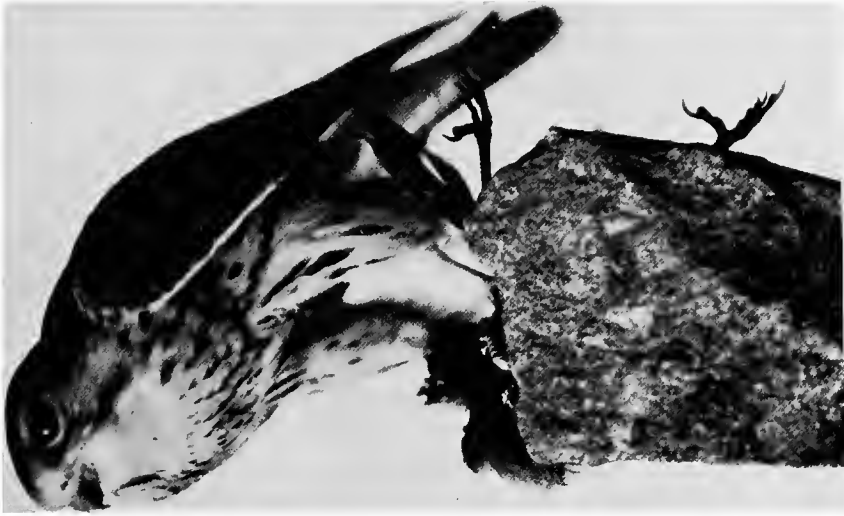
Within half an hour after I had rigged the cameras and lines and taken my station in the blind, on the foggy morning of May 20, one of the old birds came in with food. A strong pull on the lines exposed the still camera and ran the movie for the full time, but a final tug again broke one of the strings and routed the proprietor of the free-lunch counter.

After this feeding the young all wandered down to the end of the shelf (see page 615) for a snooze. Captured in the butterfly net for weighing, they seemed to hate it more



A FALCON THAT LIVED IN THIS TALL BUTTE DIVED UPON THE AUTHOR LIKE A "HELL-DIVER", AIRPLANE

Only at the last moment did the bird veer slightly and flash by, not more than 10 feet away (see text, page 611). The rusty-colored rock above and grayish sandstone below form a favorite nesting site for falcons, sparrow hawks, barn owls, rock wrens, linnets, and a twittering host of cliff swallows. Insect size on the summit appears a horseman, the district fire guard. Sheep and cattle trails weave a complicated pattern across the lower slopes.



THE PRAIRIE FALCON IS STREAMLINED FOR SPEED

The falcon, here about three months old, was tamed by the author. Another one, dubbed "Nize Baby," because he ate up all his hamburger steak, was trained for falconry. One day a sparrow hawk, little more than half his size, swooped down, struck him savagely on the back, and so startled him that he flew away and never came back.



"FULL TO THE EYES," HE LOOKS LIKE A POUTER PIGEON

Within two feet of the camera in the blind (see illustration, page 625), this young falcon gazes long and steadily out over the promised land that stretches away for miles below him. A thrifty parent has just finished stuffing him until his crop bulges through its sparse downy covering. He draws in his breath with unceasingly asthmatic croaks.

than ever. Blackie, of the evil temper, stood and cursed until I left.

The half hour's observation from the blind showed that the young were moving around very freely. Often one would run four or five feet and then exercise its wings. They also kept grabbing at small objects and occasionally pecked at each other playfully. Eating and sleeping, however, were still their main occupations.

Our repeated visits had probably convinced the old falcons that expostulation was in vain. They spent less time on the wing and permitted closer approach while at rest.

By May 23 the young were so far advanced that the riot usually attendant on weighing would probably have sent most of them flapping down the hillside. The scales and the black bag were therefore laid aside.

While pretty well scattered along the ledge, they did not seem particularly timid, and of their own accord lined up in a most satisfactory manner for the family group (see page 615). This, although we did not know it at the time, was to be our last close contact with the family.

OFF TO SEEK THEIR FORTUNE

When we reached the cliff on the afternoon of May 30, although the male came out to meet us, all of the young had left the nest ledge.

Their screams, answering the frantic yells of the parents, finally disclosed two of them sitting on a sunny ridge of a rock about 200 feet east of the nesting ledge and at about the same level. While we watched them, one flew strongly toward a saddle in the hill just above the nest cliff and disappeared behind it.

I tried to get near enough to the other to get a picture, but he went the same way when I had approached within 25 feet. With a tail wind, both youngsters set a fast pace in their first long flights. I caught just one more glimpse of them, perched in the sage and withered grass of the hillside, their breasts showing a rusty orange in the afternoon sun. Then they were gone.

We located the others resting almost motionless on the opposite end of the cliff from the nest. It was impossible to reach and photograph them. They seemed safe and contented, and so we coiled our rope, cut the camera lines, bade them an affectionate farewell, and departed homeward.

Flight characteristics observed at comparatively close range formed a thrilling feature of our falcon studies.

No one who has ever worked his way to the crest of a cliff above a falcon's nesting ledge will forget the first wild screams that greet his arrival, the arrowlike rush of the bird as it launches forth into space, turning its head to view the intruder, and the astounding exhibitions of wild and headlong flying and swooping that may follow.

BUCKING A STRONG WIND

The character of the entertainment will depend upon the individual birds, the state of their tempers, and in many cases on the strength of the wind.

We visited one cliff during a fierce gale. The female, a very large and strong bird, was sitting on the edge of the old raven's nest she had pirated for a house and absolutely refused to launch out against the wind until I suddenly dropped a coil of rope in front of her.

The results were startling. As the falcon launched herself, an unusually strong gust of wind caught her from beneath. The first lightninglike stroke of her wings shot her upward, hardly a yard from the front of the cliff and almost within arm's reach.

Upward and backward, 50 feet, she went, and then with wonderful and spectacular contortions headed into the gale. That day there was no such thing as circling. The gale was so strong that with wings scarcely opened she was buffeted about like a leaf high over head. Even while thus continually headed into the wind, she had a rough time and frequently a side gust would ruffle her feathers, blow her tail around almost at right angles to her body, and partly capsize her.

Often I had opportunity for contrasting the design of modern monoplanes and the structure of swift-flying birds, of which they are more or less crude copies. I never tired of watching a falcon come sailing in from a great distance, with wings held steady and fully extended in a very symmetrical and strongly curved downward bow.

A FALSE START IN HOUSEKEEPING

I once saw a pair of falcons make a rather interesting false start in housekeeping. After a single egg had been laid on a bare shelf, they deserted it completely for no apparent reason and raised their family in a deep pothole 30 feet below.

Another peculiarity in nesting behavior was noted at the "nest on the cliff" in 1929. Instead of placing their eggs in clear view on the ledge, as they had done the previous year, the falcons chose a pothole six feet below it. In this position the eggs could not be photographed, so we shifted the whole set to the old nesting depression.

Then for the next half hour we watched one of the keenest-sighted of all birds fly directly past its eggs, clearly visible and very conspicuous on the ledge, and go back into the pothole from which they had been removed. While in the pothole the old bird mooned around as solemnly as an owl and uttered puzzled clucks.

This seems to be a typical falcon reaction, for a fellow observer reports that a duck hawk once refused to follow its clearly visible eggs when they had been moved only two feet! It, too, went back to the exact spot where the eggs had been laid.

After we had watched the antics of the old bird in the pothole until it was certain she would not follow her eggs, they were put back. Soon after, they disappeared and are now probably resting in some collection.

THE VARIED DIET OF THE FALCON

What is the normal diet of the prairie falcon? To this question there is no definite answer.

Food remnants found at one nest by the writer and analyzed through the kind coöperation of Prof. J. O. Snyder, Department of Zoölogy, Stanford University, by Miss Lydia S. Bowen, then a graduate student,



A "BOX SEAT" ONLY SIX FEET FROM THE NEST

From inside the hanging blind the author watched and photographed his falcon friends nesting in the upper cleft, and even "dined" with them (see page 626). The spot seemed a wilderness, but no sooner was the mysterious box in place than herders, driving sheep to summer ranges, began to concentrate and inquire about it. Two years before, a falcon family occupied the lower ledge under the overhanging rock (see illustration, page 612).

gave a minimum of 45 birds and nine small mammals (gophers and ground squirrels). The most surprising item was a tasty order of eight burrowing owls.

The classified list of birds was as follows: 2 mourning doves, 8 burrowing owls, 3 horned larks, 9 California jays, 15 western meadowlarks, 3 Brewer's blackbirds, 2 California shrikes, 1 rock wren, 1 chicken, 1 unidentified.

The female of this pair was one of the largest and the male one of the smallest falcons I have ever seen, but both were superb flyers and mighty hunters, whose



ALMOST READY TO LAUNCH THE "PIANO-BOX" BLIND

On two steel cables it was lowered over the cliff, near the edge of which the author's son is standing. Entering from above by rope ladder, the observer placed his camera on a shelf, lashed down the cover, and awaited the return of the old birds (see illustration, page 625). When the big box first appeared at their very door, the falcons circled suspiciously, but instead of deserting the eggs they finally sailed in to the nest and continued rearing a family.

pro prowess was reflected in their varied list of game.

Other families studied in previous years and under different conditions were fed chiefly on ground squirrels. A fellow observer found in the Mojave Desert region a nest of five young raised to a healthy maturity on a diet of chuckwalla lizards, with an occasional collared lizard by way of variety.

My first attempts to secure movies and stills of parents and young together had been tantalizing and only partly successful. One trip down a cliff for each still shot or movie run is too much of a good thing.

Two years later, therefore, a comfortable and roomy box blind, stoutly framed and securely supported by light steel cables from two drill-steel pins, was swung into place at a favorably located nesting site.

An old cotton comforter spread in the bottom and on the bench deadened my foot-falls and made a soft seat. Cracks between the floor boards let in a cooling breeze.

The eggs, which were hatched after the blind was first lowered into place, but before it was occupied, were laid in an old raven or owl's nest instead of on the bare ledge.

The nest itself was within six feet of the cameras, and when the young began to move about the distance was often from two to four feet.

To say that I was on intimate terms with the family is putting it mildly. We even dined together, they eating ground squirrel or meadowlark on the outside, while I had a vacuum bottle of coffee, with sandwiches, fruit, and cake inside the blind.

At first the whir or click of the cameras put the old birds to hasty flight, but soon they became absolutely calloused to these noises and even to the sound of tearing off the paper tabs of the film packs.

It was astounding that one of the wildest of birds could be filmed at such close range that the portrait attachment had to be used, and the operator could have reached out to the bird with his hand.

10. 1000 1000
The Reason

LABORATORY OF ORNITHOLOGY
CORNELL UNIVERSITY
ITHACA, NEW YORK

