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FOREWORD

It has been the privilege of the Kentucky Ornithological Society to cooperate with the Nature Study Division of the Recreation Project of the W.P.A. in a program of winter feeding of birds throughout the state. Out of small beginnings the program grew to large proportions. Through the interest and indefatigable energy of Mrs. Alice Moore, Supervisor of the Nature Study Division and a member of the Kentucky Ornithological Society, it was expanded to include the building of bird houses and feeders, and then was added a series of radio programs on various topics in bird study. Information for these topics was prepared by members of the Kentucky Ornithological Society to be adapted for radio presentation.

Evidence that a wider interest in bird study has been awakened is the number of requests for material on birds, especially for programs for local bird clubs. In order partially to meet this need these papers are issued for distribution to those in the state who may desire them.

While some of the subjects are of necessity on scientific facts, each author has attempted to omit technical terms and to give his information so that it may be understood by the beginner. Other topics will show that all of bird study need not be entirely serious. Much that is humorous can be found both in the birds and in the bird students. Every ornithologist, or bird student, even though he may spend much time collecting scientific data, not only finds sincere pleasure in his investigations but takes real delight in the antics of the birds and in the companionship of his fellow students.

It is hoped that these suggestions for topics may serve to widen the circle of those who find an inner satisfaction in learning and knowing more about this interesting phase of wild life.

April, 1941.

Evelyn J. Schneider,
President Kentucky Ornithological Society

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PREFACE

Very few ornithologists spring full fledged - like Minerva from the brain of Zeus. We begin falteringly. We make mistakes. We learn and unlearm many things before we gain our "sea going legs" and are able to hold our own among others of the tribe. To most beginners a bird that is blue is a bluebird, a bird that is red is a redbird, a bird that is black is a blackbird, or maybe a crow. Well do I remember the shock I received when my grandfather pointed out to me an Indogo Bunting and I found that all my blue birds were not bluebirds after all!

The love of birds is almost universal. To nearly everyone they represent something beyond and outside themselves, a part of the mystery and poetry of nature. These radio scripts have captured some of that mystery and poetry for us. To the esthetic pleasure of knowing birds and having their companionship has been added the great economic value and the field has been given new significance.

The scripts were prepared for presentation over Kentucky radio stations. They contain so much valuable information of interest of bird lovers and nature leaders that we have preserved them in mimeographed form. I am sure you will find them as interesting as we have found them and will think of many ways in which they may be used, such as the basis for club programs, as supplementry teaching material for nature classes, etc.

April, 1941.

Alice Moore,
Nature Study and Camping

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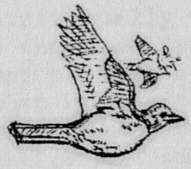

SOME HINTS ON BIRD STUDY

By Gordon Wilson

The time-honored recipe for making rabbit pie has been "First catch your rabbit." However, it is not necessary for a prospective ornithologist to catch his bird. In fact, most ornithologists prefer to have their birds in the bush rather than in the hand. Even collectors are as hearty as any of us in their desire to preserve the birds, taking only a few specimens for scientific study and leaving the rest alone. This method of studying birds as living, interesting creatures is not a new one, for Alexander Wilson, more than a hundred years ago, wrote his masterful essays right in the woods, with the birds under observation. By degrees a large percentage of bird students have come to respect a field knowledge to supplement laboratory methods of ornithology. Such a book as Roger Tory Peterson's a "Field Guide to the Birds" has made many a person, who was slightly skeptical about naturalists, accept them with a little more tolerance. Scientists will continue to take specimens, but more and more the study of birds will center in field observations with field glasses or with the naked, well-trained eye.

"When shall I begin to study birds?" This question is asked me often. Unlike many courses in schools and colleges, ornithology as a hobby may be begun at any time, for the material is always at hand and usually abundant. Probably winter offers a better opportunity because of the absence of foliage and the fact that there are only a few species here at that time. It is true that birds are somberly clad in winter, but their gentleness makes up somewhat for this loss. Besides, if you learn the birds of the winter, you will be able to see your friends blossom out in all their spring finery right before your eyes and will also learn many a new species as the migration starts. Of course, you need not expect to learn all the migrants as they come, even if you wanted to. John Burroughs has said that doing this would spoil years of walking and searching for new species. This makes the hobby of bird study a perennial one; ornithologists have difficulty in taking time out for sickness or even death, so eager are they to see their old friends come back. Besides, the approaching season might bring the long-sought bird that we never find, but always look for.

"What equipment do I need?" Two eyes will do and have done for many people, though they certainly need supplementing. Of the 233 species of birds that I have recorded for my usual territory of observation, more than 150 of them were first identified by the naked eye. When eyes, like the old gray mare, "ain't what they used to be," a pair of field glasses will increase the range of vision. Hundreds of field naturalists carry inexpensive four-power glasses, though by degrees more powerful ones are appearing among my friends who study birds. For water birds and other shy species that cannot be approached closely, a telescope is an excellent thing to own or use. However, it is not a cause for despair when you cannot spend a large sum on field glasses, for eyes were made before lenses, just as fingers were made before knives and forks.

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"Where shall I go?" All of you remember Booker T. Washington's story about letting down your buckets where you are. That story would apply equally well in bird study; birds are everywhere for eyes that see and ears that hear. Except in the migration season, a heavy wood, as such, is not a good place to study birds. If the wood is surrounded by open, cultivated fields, then it is often a valuable hiding place. The best places to find birds are roadsides, bushy fence rows, shrubby thickets, and along watercourses. When the height of spring migration comes, however, even the densest wood becomes alive with birds. A certain woodlot less than a mile from a good-sized city has yielded as many as sixty-four species within three hours in early May. By degrees the student learns the haunts of birds, and naturally he returns there again and again. Some of us make actual paths through our best areas. With a little experimenting you can spot a good place for birds just as you can locate a suitable place for a camp or picnic.

"What is bird study for?" Others on this series will tell you about conservation; others who know more about the subject and are eager to do something effective and lasting for birds. That is a very valuable reason for bird study, one that many of us can use, particularly when we talk with people who own the areas where our birds congregate. Personally, I have found ornithology valuable for knowledge, health, and friendship. Everybody needs a hobby. More exercise is good, but if the exercise adds some new facts, then it is better. The daily or weekly or monthly records that ornithologists keep gradually acquire an intrinsic value all out of proportion to their seeming value. Observations honestly made and kept are research of a high order and cannot be duplicated by any other method. Years of association with a certain area make a bird student a scholar of a rare kind. It is fairly easy to keep good records of one's observations, but nobody can properly evaluate the vigor of health gained by persistent following of an outdoor hobby. Health comes thus by a roundabout process, as a byproduct of something else. Those who seek health for itself impress their friends as queer and boresome; one rarely thinks that the hobbyist is quite as certainly trying to improve his health, but without regaling his friends with all the nauseating details. Better than knowledge as such, better than health, is the philosophy the bird student develops over a long period of time. His knowledge, which is a definite thing that can be weighed and measured, is transformed into lore, a pervasive charm of personality and outlook. Much of this is brought about by the friendships that one forms while watching year by year for new and old birds. Nearly every ornithologist has a younger understudy. Ancient lawyers, as in the days of Cicero, taught their novices by the routine duties of the day. In a very similar fashion the bird student takes a young fellow along and gradually impresses facts upon him, helping him to acquire nature-lore along with his knowledge. This philosophy of the ornithologist makes all of us strangely alike. When a group of us meet for the first time, it takes only a moment or two to make all necessary introductions and adjustments; at once we are in our conception of heaven on earth, a companionship with others of our kind who feel and react, almost instinctively, as we do.

"Why are bird students so funny?" I realize that we are a strange lot. We call each other "bird fiends." That about describes us, for we seem to more sedate people to be chasing after phantoms. One such outsider once said that a bird student of his acquaintance knew birds so well that he could identify them without either seeing or hearing them. Still another said that some ornithologists with whom he took a very early morning walk could see birds in trees when he could not even see the trees. The lingo of ornithologists has never been

studied by lexicographers, but it would be as interesting as that of baseball or football or golf. The uninitiated apparently expect us to be dealing with the spectacular and are surprised when they discover the commotion of the group of elderly or middle-aged men and women trailed by a few wild-eyed boys about some dull-colored bird no bigger than an English Sparrow. I have never seen any such people tap their foreheads as did Rip Van Winkle's neighborhood when he came back to town after his lengthly nap in the mountains, but I am sure that many smart things were said behind my back. It is astonishing, though, how many people who, like the proverbial ignorant man, do not know a Jaybird from a Crow, feel flattered by the repeated visits to their fields or woods or ponds, of mild-mannered people who bring no guns, but who follow the movements of all sorts of birds as if their very soul's salvation depended upon what they would learn on a single hike. Often we are plied with hundreds of primer or first-grade questions that amuse us quite as much as our queer manners amuse the uninitiated. Sometimes we even pick up a few new recruits from these very skeptics.

Now, isn't ornithology an interesting hobby, since it opens up one of the great fields of human knowledge; brings bounding pulses and good appetities and rest from professional and business life, and encourages friendships that are unselfish and genuine? We may not be as numerous as the species of human being described by P. T. Barnum, but there are enough of us to be located if you want to join us on our walks or help us look for the return of the migrants.

NATURAL FOOD AND COVER

Virgil D. King

Wasteful habits of land use have prevailed throughout the major part of our national life. In our zeal for complete subjugation of the land, we removed the earth's vegative covering without giving a single thought to the fact that it serves as a protective function for the good earth and the creatures living thereon. Today we see the results of past land abuse on every hand - gullied fields, silted streams, declining crop fields and wildlife populations, and abandoned farmsteads.

Trees and grasses serve the same protective function for the earth that our skin performs for our body. Remove any considerable area of skin, and we have a horrible sore; yet we have ripped off the protective covering of vegetation from our land as we would strip the hide from a rabbit. With it have gone billions of tons of our richest soil and a tremendous part of our wildlife. Wildlife cannot exist on bare and gullied land. Our native animals are making their last stand against civilization. Many of them are doomed and their existance seems to be only a matter of a few years.

Once, upon this continent, flights of passenger pigeons "darkened the sky for hours on end" by their vast numbers, so that chickens went to roost at midday. Herds of buffalo a mile square roamed over the western plains in an undalant mat of dark brown wool. Ducks and geese V-ed north and south with the changing seasons, a million in a skein. The waters teemed with life. This was America 100 years ago. Today the picture is different and the change is largely the result of man's destruction of natural vegetation.

Cover is anything that provides a favorable retreat for wildlife or offers it shelter or protection. Wild creatures cannot exist without cover. Even though there is an abundance of food, it cannot be utilized by wildlife unless it is in or near cover. A creature's natural enemies will destroy it if it attempts to feed in open areas.

Cover varies greatly with seasonal changes. A covey of quail, which enjoys an abundance of cover during the summer, often finds itself exposed to its enemies and the elements with the first killing frost which levels most vegetation to the ground. Evergreens and other plants which form dense growths are particularly valuable for winter cover. Burning a field over is a very wasteful procedure. It not only destroys natural food and cover but also valuable organic material needed by the soil.

Nearly everyone delights in the lusty whistle of the bobwhite from a nearby fence post, the antics of squirrels in the big oaks of the lawn, and the sudden flash of white along a cow-path as a cottontail rabbit disappears into a briar patch. Furthermore there are few people who will intentionally destroy the nest of a jenny wren, robin, or mockingbird; yet, many people unknowingly destroy the nesting sites of beneificial birds. The chopping down of a dead tree may mean the death of a family of woodpeckers or of a den of squirrels. The pasturing of a woodlot may eliminate a covey of quail as well as to lessen the growth of the trees. The cleaning out of a fence row destroys nesting sites of many insect eating birds which the farmer needs to help him in his efforts to compete with myriads of insect pests. The fate of man without birds to help him fight insects is not known and is not fully appreciated.

During the summer there is an abundance of insect food and succulent vegetation. This is supplemented by occasional wild cherries, mulberries, hackberries, blackberries, and other fruits. Hickories, oaks, walnuts, and buckeyes furnish winter food. Wild grape, black haw, crataegus, bitter-sweet, hazelnut, coralberry, and poison ivy supply additional food. During November 1940, four mockingbirds, one red-bellied woodpecker and one starling were observed, all feeding upon the berries of the poison ivy on a corner fence post. These birds were quarreling among themselves and displayed keen interest and competition for the berries. Staghorn sumac, euonymus, honey-suckle, dogwood and other less common plants supply some food. Although there is a variety of food producing plants in Kentucky, few of them are numerous. Winter food may be a limiting factor to some wildlife forms.

Korean lespedeza was introduced several years ago. Since it supplies excellent forage during the summer dormant season of Kentucky bluegrass, it is looked upon with favor by the farmer. There is a marked tendency toward increasing the acreage of this plant. Because the seed of Korean lespedeza is a preferred food of bobwhite quail, this plant promises to produce a staple winter food. However, full utilization of lespedeza seed by quail will not be possible unless it is grown in combination with or adjacent to plants that produce good cover. A field of lespedeza must have thick borders of briars, ragweeds, and other plants before quail can safely feed upon its seed.

Water should be in such relation to cover, that animals seeking a drink or bath would not fall an easy prey to their enemies. Streams need trees along their banks and ponds should be fenced and the banks planted to shrubs and trees that produce food and cover.

Most of the conservation measures recommended by the soil conservation programs of the government tend to encourage wildlife forms. Contour strip-cropping is beneficial to birdlife because it sets up an interspersion of vegetative types which increase the number of acceptable nesting territories within a given area. A modified form of strip-cropping is that of sowing cane (sorgum) strips in crop fields. These strips are sown on the contour in rather steep fields to prevent or reduce erosion. This practice makes available large quantities of winter food, because farmers leave much of the cane unharvested.

Many miles of diversion ditches have been constructed in Kentucky by farmers and government technicians. Ground nesting species of birds find grassy cover in the sod filter strip above these ditches. Sodded waterways offer protective cover and travel lanes. Farmers often sow cane in gullies. Since this cane is seldom harvested, it furnishes cover and nutritious winter food and cover for wildlife.

The important part played by forests and woodlands in the production of wildlife has been a matter of common knowledge ever since man began to hunt. Fortunately, it is true, also, that properly maintained wildlife populations have an important beneficial effect upon the forests and woodlands they inhabit. In particular, the relation between insectivorous birds and mammals and forest pests have been studied, and it is known with certainty that while wildlife is unable to cope with sudden and spectacular outbreaks of forest insects, its continued repressive action upon them is of fundamental value to the maintenance of healthy timber stands. A nest of crested flycatchers in a catalpa tree were observed from daylight until dark one July day and it was found that the parents brought food to their fledglings 265 times that day - it was all insect food. A red-headed woodpecker feeding upon flying insects along the edge of a woodland was seen to catch fifteen insects on the wing during a five minute period. He watched for his prey from an old dead snag.

Trees should be planted on gullied areas and steep areas that are not suitable for the production of crops or meadows. A survey in the fall of 1939 was made on a 7-acre field that had been converted from gullied pasture to woodland. Black locusts were planted in the field in the spring of 1936 and it was fenced to protect the trees against livestock. Forty-two nests and ten cottontail rabbits were found, which was ample evidence that this once bare and gullied field had become an attractive wildlife habitat, due to the production of cover. The nests found were of the following species: 25 field sparrows, 7 indigo buntings, 5 catbirds, 3 yellow-trested chat, 1 eastern cardinal and 1 white-eyed vireo. All of these species pursue an insectivorous diet during the summer. It would be impossible to estimate the number of insects consumed by the occupants of these nests or the damage the insects would have effected if they had not been destroyed.

A border of trees and shrubs should be planted around every tree planting area. This border will prevent wind from blowing away the leaf litter and drying out the soil; thus, the trees will grow faster. The border also supplies nesting sites and food for birds that patrol the forest trees and eat the insects. Mixed plantings are recommended.

The Germans, who taught the world to plant trees like cabbages in large blocks of pure plantings of one type of tree, have scrapped their own teachings and gone back to mixed woods of native species. The "cabbage brand" of forestry, at first seemingly profitable,was found by experience to carry unforseen biotic penalties: insect epidemics, soil sickness, declining yields, foodless deer, improverished flora, distorted bird population, etc. In their new system the hard-headed Germans are now propagating owls, woodpeckers, titmice, goshawks, and other forms of wildlife.

Many birds eat the seed of crab grass,beggar lice,bindweed, foxtail grass, greenbrier, lamb's quarter, nail grass, poison ivy, pokeberry, ragweed, pigweed,smartweed, sheep sorrel and Spanish needles. Other types and shrubs that produce food and cover for birds are: the beech, black gum, elderberry, honeysuckle, huckleberry, partridge berry, persimmon, pine seed, sassafras, service berry and wild plum.

In conclusion, let us venture a brief description of a well-managed farm that will have sufficient natural food and cover for birdlife. The livestock are confined to pasture - all woodlands, swamps, and ponds are protected from livestock. Fields and woods are not burned. Streams flow clear and cool and the banks are blanketed with vegetation - no straightening of meandering curves and no concrete bottoms. Woodlands are a natural, healthy community with trees of all sizes and native varieties - mostly straight-boled but with some snags and the margins surrounded with shrubs. The fields are fitted to the land with luxuriant crops. Little erosion occurs in the winding contour crop bands that fit the topography like a custom-made garment. There is a network of well-kept hedges on many of the contour field borders. All odd corners such as rock outcrops, former gullies, stream banks, sink holes and similar areas are in thickets of shrubs or other protective cover. There is an equilibrium of plant and animal life. Woods and waters frame the crop fields in stable soil. There are song birds for the insects, hawks for the mice, foxes for the rabbits, scattered patches of violets and clumps of orchids. Muskrats from the pond and skunks from the thickets enrich the boy's spending money. In the Virburnum hedge there is a covey of quail. The farmer brags about the 122 species of birds that visit his farm yearly. He is proud that the rains no longer add color to his clear stream. Here, we have natural food and cover, health for the land, and happiness for the people.

HAWKS AND OWLS
The Farmer's Friends

By Burt L. Monroe
Kentucky State Ornithologist

Today, conservation and education go hand in hand. Education is no longer the process of pouring countless facts into the heads of the learners. Education today strives to give, to the individual, ability to use facts; to consider their source, to weight their value and to form judgements - in other words to think.

That conservation of our natural resources should be taught to young people need not be argued. The realization that, within recent years, man has exterminated several interesting forms of life, and has reduced other valuable forms to such low ebb that there is national concern for their safety has awakened an interest about conservation that was never before known. Today one reads about conservation in almost all papers and magazines. One hears conservation on the street, at informal gatherings, and over the air. How important it is, then, that our coming citizens know the true facts concerning our wildlife and the reasons and methods for saving it.

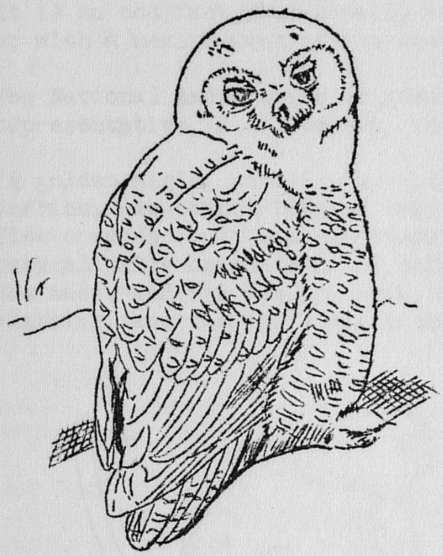
One point must be made clear. True conservation teaching must be definitely severed from sentimentality. For years nature classes and organizations have attempted to save our wildlife through sympathy and sentiment. Yet, with the millions that have been exposed to such teachings, every year has witnessed a decline in wildlife. True relationships between man and the lower animals must be understood and appreciated. People must know the value of our wildlife before they will try to save it. To illustrate this, I have found I can talk at great length to people on the mystery of our owls, their skill and grace in the air, their protective colorations and their marvelous adaptations to their environment without awakening an interest and appreciation of these birds in more than a few persons. But to show them the contents of a few owl stomachs, have them study statistics on the economic value as compiled by many authorities, then add to this the aesthetic value, and the majority of them will then realize that owls should be protected for the sake of man.

Because sportsmen and conservationists are not in agreement on all methods of conservation, the subject becomes controversial. Yet both sportsmen and conservationists are emphatic in the belief that the only hope of saving much that still remains of our wildlife is through education. Facts based upon scientific research and study must replace many of the old beliefs which were founded on a few casual observations made by untrained naturalists. Authorities in conservation and game management must be recognized and their word given first consideration. Superstition must be replaced by truth. It then follows that, if it is worth teaching, it is worth teaching right. Probably no course of study offers more opportunity to meet the challenge of this new education than does biology.

As an illustration that most people are ignorant of most wildlife and that education is necessary, let me cite a few examples:

Trackwalkers along a lonely stretch on one of the principal railroads leading into the city of Washington some years ago were terrified at night by a moving white object that glided noiselessly through the air. It was interpreted as the ghost of a man who had been killed in the vicinity. After several weeks, during which this spirit of the night had appeared at intervals, striking terror to the

soul of the observer, the apparition was laid most effectively when a large snowy owl was shot from its perch in a tree by a hunter.



Most people have the wrong impression of owls. Now, take Shakespeare. He used owls to create tragedy and gloom, and that sort of thing made the public associate the owl with a graveyard.

The voices of owls are more familiar than their persons, as most of them are active principally at night and, without special search, the birds themselves are difficult to see. Their presence, unseen but constantly evident, has caused imagination to play about them until in practically every country in the world there have grown up fables and superstitions regarding owls. The opinion of owls in our own country is clearly evidenced by this clipping:-

"Man Eating Owls are combatted by Missouri Townsmen, St. Charles, Mo., June 28 (AP) Police blame the heat for the town's latest menace, screech owls. The ordinarily harmless birds have been on a rampage, swooping down and scratching unwary evening strollers. Police shock troops have bagged thirteen owls, so now the citizenry is breathing easier."

I'm not from Missouri, but I would have to be shown that those screech owls - those mites in feathers - were as terrible as they were pictured. I've seen them swoop down and crack their beaks whenever one approached near their nests or their young ones, and I know of instances where they actually touched the hats of persons, but I don't know of instances where a riot call was sent in for the police shock-troops to turn the tide of battle into a victory for the worried citizens.

The odd, the unique, and the extraordinary has always fascinated man. The less man knows of a wild animal, the more willing he is to believe and pass on incredible and fabulous stories about it. Eagles have always mystified and awed man, and it is only natural that fantastic tales concerning these birds should be quickly accepted. One of the most persistent of such stories is that eagles carry off unprotected babies. It is doubtful if a search of history would reveal one authentic case of such a happening. Eagles weigh from eight to twelve pounds and it is the exceptional bird that can carry more than its own weight. Babies weighing twelve pounds or less are not left unprotected so that eagles will be tempted to take them.

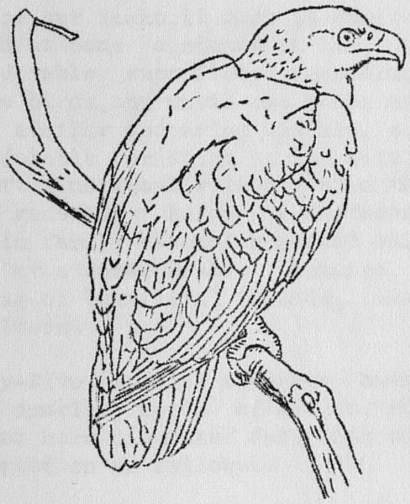
"Eagle kidnaps Baby, Child Saved as Bird Dies on Electric Wires." Hugo, Minn. October 15 (INS) - "A nine-months-old baby was safe today after being kidnapped by an eagle and almost electrocuted when the bird collided with high tension wires. Victim of the near-tragedy was Darline Lindberg, who, wrapped in a blanket, was lifted 20 feet in the air by a hugh American Eagle. The bird, weighted down by the sixteen pound load, was unable to clear a high-tension wire. The high voltage electrocuted the eagle, which volplaned to the ground with the baby still clutched

in its talons. Darline suffered only slight bruises and scratches. The bird measured nine feet from wing-tip to wing-tip."

It is an odd fact, but usually such stories, when the bird is exterminated, winds up with a measurement of the wing-spread.

The National Association of Audubon Societies investigated this story. From their representative, J. P. Jenson, they got the truth. Mr. Jenson reported:

"A golden Eagle, with a wing-spread of 86 inches, apparently investigating some carrion, was caught between two automobiles on the pavement of a city street. It flew upwards and was electrocuted by a high tension wire above. The eagle was only slightly burned and is being mounted by Mr. Arnold Lindberg. The baby in the case, and its mother, were, at the time of the eagle incident, 260 miles away visiting, and the story was given to the newspaper as a joke."



So many such stories have appeared over the years that recently two scientists decided to make some experiments along this line. They took a young golden Eagle and trained it in the art of falconry. It was taught to fly to an object and bring it back to its masters. When the eagle had reached maturity, and had reached its full power of flight, an interesting experiment was made. An eighteen foot tower was built from which the eagle, bearing weights attached to its feet, could be launched. This gave the bird the edge over having to take off from the ground and therefore remove any doubt as to its weight-carrying ability. Two-pound weights were attached and the bird launched into the air. The weights did not seem to bother it in the least and it sailed and dipped at will. The weights were then doubled, and with four pounds attached the eagle was able to fly, but all soaring, dipping, and quick turning was discontinued. Then the weights were again doubled, eight pounds being attached, but this proved too much for the enormous bird. It flopped hopelessly from the tower and plummeted to the ground less than fifty yards away. It must be remembered that this bird had all of its full powers of flight, had been daily allowed its freedom, and received as much exercise as any bird in the wild, yet it could not handle eight pounds of weight. This one experiment should prove definitely that eagles do not carry off children and should lay to rest such stories as the one about the man who was injured, as he rode along in his automobile, by a calf which an Eagle was carrying off, accidently dropped from a great altitude, and crashed through the top of his car.

The time came quite some few years ago when there developed in the public mind a strong prejudice against all raptorial birds, the assumption being that they were largely responsible for the rapid decline in the supply of wild game birds, as well as detrimental to the interests of poultry raisers and game breeders. Game protective officials and sportsmen generally agreed with this point of view.

Few birds have been as severely and unjustly condemned as have our hawks and owls. Erroneous statements regarding their food habits have started rumors now prevalent that hawks are "chicken hawks" and should be killed. Without attempting to find if there is not some good in the hawk and owl tribe, the whole race is condemned. While it is true that some song birds and game birds and occasionally poultry are eaten by hawks and owls, yet an examination of their stomachs show few birds are eaten compared to the many mammals consumed. The mammals consist chiefly of the most destrictive rodents the farmer has to content with, namely mice, rats, gophers, ground dquirrles, moles, shrews, and rabbits. Upon further investigation we find that all hawks and owls are condemned for the actions of a few. The situation might be likened to this comparison:

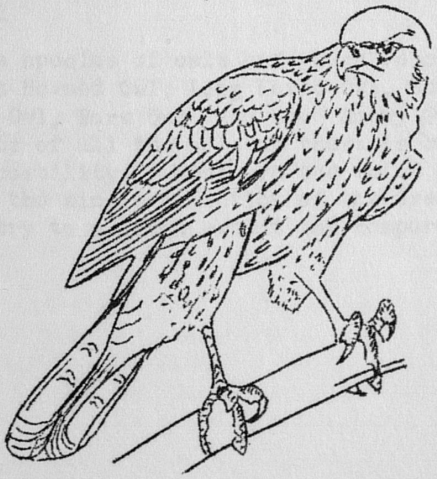
If one should see a man in a blue suit making his escape after robbing a house, and should thereupon sally forth into the street with a shotgun and blaze away at every man in a blue suit that he happened to meet, he would be carrying out in practice the principle upon which many act when they wage indiscriminate warfare upon our native birds of prey.

Many of our hawks, it must be admitted, are difficult of exact identification when viewed at some distance in the field. Closely related species sometimes show considerable superficial resemblances in coloration, particularly among the immature birds, and until one knows exactly what to look for in order to distinguish these similar appearing species, confusion is almost inevitable. There is often considerable variation in the size of members of the same species and the females are often noticeably larger than the males. However, the beneficial and harmful hawks generally belong to different groups, the members of each of which have certain family resemblances and which permit of their classification as "good" or "bad" at a considerable distance, so that there should be little excuse for the killing of beneficial species, like the Buteos, "by mistake" for the bird-killing Accipiters.

Thirty-five species of hawks have been recorded as residents and visitants in North America, north of Mexico, but only fourteen are found in Kentucky. The species here discussed fall into six well-defined groups, which may be named and commented on as follows:

Blue Darters or Accipiters

The Goshawk, Sharp-shinned Hawk, and Cooper's Hawk are the hawks ordinarily called Blue Darters. They are elusive species, keeping more closely to cover than any other groups. Occasionally, as in migration, they get up in the air and circle and soar, but ordinarily with quick, even strokes, alternating with short sails, they skim about close to or even among trees and shrubbery, pouncing abruptly upon their prey. When on the kill these bird hawks are audacious, snatching prey from under man's very nose. Blue Darters have long, narrow tails and comparatively short, rounded wings. The wings are barred and the body streaked.



Mouse Hawks or Buteos

The hawks ordinarily known as "Mouse Hawks" and, quite often as "Chicken" or "Hen Hawks", are the Red-tailed Hawk, Red-shouldered Hawk, Broad-winged Hawk, and the American Roughlegged Hawk. Almost anywhere in the state of Kentucky a large hawk, posing long on a conspicuous perch, soaring about in lazy circlings or hovering usually more clumsily than that expert, the Sparrow Hawk, is likely to be one of the Mouse Hawks, or Buteos. These hawks show themselves more in the open and are not so alert, swift, or elusive as the Blue Darters and, being easier victims of the gun, often suffer for the misdeeds of that group. They have broad, short tails and broad wings.

Marsh Hawk or Harrier:

There is only one species, the Marsh Hawk, which beats back and forth, over marsh, meadow, and grasslands with a floppy sort of flight, dropping on prey it surprises in openings.

Falcons:

Hawks of the falcon group - Duck Hawk, Pigeon Hawk, and Sparrow Hawk - have distinctly pointed wings, rapid wing beats, and a swallow-like or pigeon-like flight. They are so expert a-wing that they take much of their prey in the air. The familiar little Sparrow Hawk is an exception in this respect; it is furthermore the only species of falcon that is both generally distributed and numerous.

Eagles:

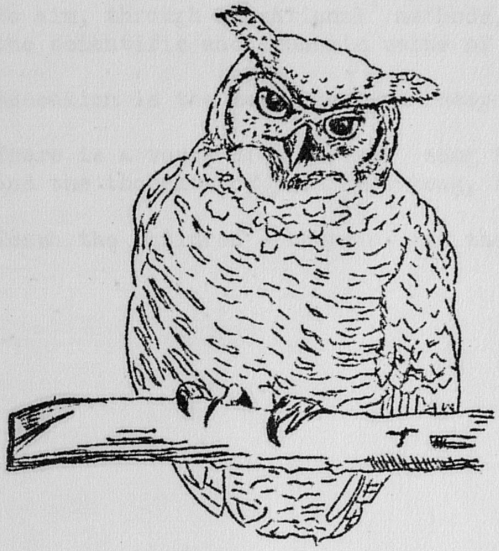
Size alone will distinguish the Golden Eagle and the Bald Eagle from the other hawks, and only the vultures are likely to be confused with them in flight. The latter, however, make soaring a must greater share of their total flying activities. The steady beat of long, sweeping wings need only be noted to remove all doubt that an eagle, not a vulture, is under observation.

Fish Hawks:

There is only one species of American Hawk, the Osprey, that gets practically all its food from water.

Owls:

Eight species of owls have been recorded from the state of Kentucky, namely the Great Horned Owl, Long Eared Owl, Short Eared Owl, Barred Owl, Screech Owl, Saw-whet Owl, Barn Owl, and the Snowy Owl. It will be needless to elaborate on the habits of all the wols as there is but one species against which we have any cause for hostility. Mice are the chief food of owls; they also destroy some insects. With the single exception of the Great Horned Owl, they destroy neither game nor poultry to a great extent and comparatively few birds of any kind.



The Barn Owl is perhaps the most notoriously beneficial. The Great Horned Owl must be placed in a class with the Goshawk and Cooper's Hawk as really destructive to game and poultry. But even when the Great Horned Owl is troublesome, it is, by its great size and striking appearance easily distinguished from the useful kinds, and there is not a particle of excuse for shooting any of the other owls for its offenses.

Neither is there a particle of reason for putting the Snowy Owl on the unprotected list. It feeds mainly on rodents and its rarity in this state renders it practically harmless from an economic standpoint. Yet, when exceptionally severe weather or lack of food drives the Snowy Owl from its Northern home, practically everyone of them that enters the United States is slaughtered on account of its conspicuousness and beauty. Hardly a single one ever lives to return.

The case of our birds of prey is a long way from being decided; however, in many instances, progress is being made in educating the people that hawks and owls should not be exterminated. A statement of policy with relation to the preservation of these birds is being used by many groups in the country today. It is:

We oppose the extermination of any species of bird; in this we include Hawks and Owls.

We advocate protection, under all conditions,of rare hawks, such as the Duck Hawk, and of beneficial hawks and owls, such as the Broad-winged Hawk and Barn Owl.

We oppose the killing of hawks and owls, other than those individual birds known to be damaging property.

We condemn bounties, hawk campaigns and general hawk shoots because:

First: They result in indiscrimate killing, without regard to merit, as great numbers of hunters are not qualified to tell one species of hawk or owl from another.

Second: They put many hunters in the field outside the regular shooting season, making law enforcement more difficult.

Third: If control is needed, such work should be conducted by properly qualified authorities.

We aim, through educational methods, to create greater popular appreciation of the scientific and economic value of hawks and owls.

Education is the most powerful weapon for the cause of conservation yet devised.

There is a verse of a Lapland song that says; "A boy's will is the wind's will, and the thoughts of youth are long, long, thoughts."

Teach the children - therein lies the salvation of wildlife.

HOW BIRDS MIGRATE

By Harvey B. Lovell
(President Beckham Bird Club)

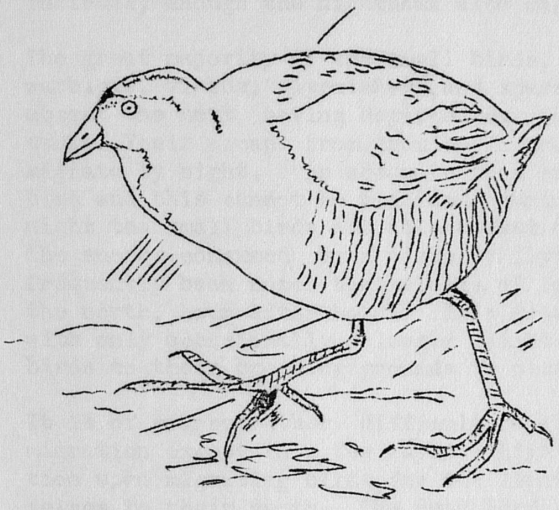
One of the most interesting features in the activities of birds is their habit of migration each fall and spring. Almost every bird has its own migration route which it follows year after year in some miraculous fashion. Even young birds seem able to follow this path for the first time without the leadership of the older birds. It is no wonder that the mysterious disappearances of birds in the fall and their equally remarkable reappearance the next spring at almost the same day has led the many queer beliefs about migration.

Our earliest records about bird flight are found in the Bible. In Job occurs the question "Doth the hawk fly by the wisdom,and stretch her wings toward the south?" While in Numbers Chapter XI is described a most interesting migration of quail. "There went forth a wind from the Lord and brought quails from the sea. The people stood up all that day and all that night, and all the next day and they gathered the quails: he that gathered least gathered ten homers." This great hunt is believed to have taken place about 1580 B. C. The 600 men who comprised the Israelite tribe may have killed nine million quail according to one estimate. This fortuitous appearance of an abundant source of food must have seemed miraculous to the starving Hebrews.

It has not always been known that birds migrate and many attempt to explain their sudden disappearance and reappearance have been made. A common explanation was that birds hibernate in the winter as do the great majority of cold blooded animals such as snakes, turtles, and frogs. Even such warm blooded animals as the ground-hog and the bear are known to hibernate, so that it is not surprising that many people ascribe similar habits to the birds. Swallows were thought to spend the winters sleeping in the mud at the bottom of ponds. People who watched swallows circling over the ponds in late fall as they fed on the flying insects, claimed to have seen the swallows dive into the water and not come up. Others said that they observed the swallows perch in such great numbers on slender reeds that the plants gradually sank below the surface carrying the birds with them. In this way they explained the observed fact that the swallows would be thick one day and completely gone the next. Old books often contained pictures of fishermen hawling in nets filled with a mixed catch of fish and swallows. Learned papers were read before the French Academy and the Royal Society in London upon bird hibernation. The great American ornithologist Coues, as recently as sixty years ago cited more than 175 titles of books and papers dealing with swallow hibration alone and came to the reluctant conclusion that there must be some truth in the belief.

Gradually as the winter homes of the various kinds of birds were discovered in the south, the old ideas were discarded for all birds except the chimney swift, the winter home of which is unknown even until this day. The swift must certainly hibernate, said the majority of observers, and frequent reports of finding this bird sleeping in hollow trees were current. It was reported that if such hibernating birds were brought into the warmth of a room they would quickly thaw out and become active, but that they would soon die unless returned to their proper place where they could continue their long winter sleep. Even these reports have now been thoroughly disproved and the southern path of the chimney swift across the United States has been traced by bird banders from chimney to chimney until they reach the shores of the Gulf of Mexico. There, however, they take off to

spend the winter in some unknown place, probably in the wilds of tropical South America. Some day in the not too distant future some explorer is going to shoot a swift in these jungles and find upon its leg a band placed there by a bander in the United States and the last great mystery of American bird migration will be solved.



Another interesting solution which was advanced to explain the disappearance of the birds was the transmutation theory. The famous Greek philosopher and scientist, Aristotle though that many of the summer birds were changed into winter species of different colors. Many marsh birds such as the Sora Rail were thought to change into frogs and live in the ponds during the winter and to return to their bird-like form only with the arrival of warm weather. Geese were described as being formed from the large goose barnacles which grow on the sunken legs and rocks of the seacoast.

Another most imaginative solution to the disappearance of the birds was presented in a paper by an English writer in 1703. The author suggested that the birds migrated to the moon. The time required was said to be about sixty days which of course had to be carefully synchronized in order not to miss the moon as it rotated by. The birds lived on their stored fat during the journey and since they had no objects to avoid were able to sleep while winging their way through space. No thought was given to their air supply or the extreme cold of interstellar space by this ornithologist of two centuries ago.

Modern knowledge about migration is obtained from many sources and is rapidly solving some of the most perplexing problems. The application of tiny aluminun bands to the legs of birds takes first place in this work. These bands have a number and direct the finder to report the fact to the Biological Survey, Washington, D. C., where all the information is kept on file under the direction of Frederick C. Lincoln. An efficient catalogue system makes it possible to assemble the facts about the movements of each species of bird in a few moments.

In order to migrate, an animal must be equipped with excellent organs of locomotion. Migration is confined to a few groups, namely birds, fishes, a few kinds of insects, and a few mammals. Birds are best able to migrate due to their rapid flight through air, a medium which offers few hinderances to their progress.

Flying requires a great deal of strength and energy. Birds have a body temperature which is 5 to 12 degrees higher than man's and they have a much larger heart in proportion to their weight. Their lungs are very large and efficient. Special air sacs lead from the lungs to all parts of the birds body even into the very bones themselves. As a bird flies, the pressure of the wing muscles compress the air sacs with each wing beat. Thus the air sacs act as bellows pumping the air in and out of the lungs, with very little trouble to the bird. Birds live more rapidly than any other organism.

The smaller, more timid birds usually migrate by night. The larger, more powerful birds usually migrate by day and night. Loons, cranes, pelicans, gulls, and hawks usually migrate by day. They have little to fear from the attacks of other birds. Curiously enough the nighthawk also migrates by day.

The great majority of the small birds, however, prefer to fly by night. The tiny warblers, vireos, flycatchers,and sparrows will be plentiful one day and entirely absent the next, having departed on their migrations with the gathering of the dusk. Their escape from enemies is probably not the only reason that small birds migrate by night. An adequate food supply is most important to the hot-blooded bird and this cannot be obtained during the hours of darkness. By migrating by night the small birds are able to eat during the hours of daylight and so replenish the energy consumed by a night of flying. During the spring migration it has frequently been noted that flocks of feeding birds are constantly working toward the north, hour after hour. This gradual movement of a dozen or so miles a day with only occasionally a longer flight must frequently be sufficient to bring the birds to their breeding grounds in plenty of time.

It is of course rather difficult to obtain much information about nocturnal bird migration except in a few ways. Lighthouses often seem to have a fatal fascination upon migrating birds,for the light attracts them irresistably, to dash themselves to their death. The dead birds are identified and counted so this regretable incident is made to yield valuable information. Luckily, revolving and flashing lights are less liable to fascinate the nocturnal migrants than stationary ones and have largely been substituted.

Astronomers have frequently reported observing birds flying across the moon in such numbers as to render their lunar studies difficult. Ornithologists have used telescopes to estimate the number and kinds of birds flying at night with considerable success.

Perhaps the best results have been obtained by highly trained ornithologists who identify the migranting species by their calls. During the height of a migration, the darkness may be filled with the notes of passing birds often so numerous as to fill the night with their chatter. Most of these can be recognized by experts in bird song and thus the kind and relative number of nocturnal migrants estimated.

For a long time it was believed that birds migrate at great altitudes, for it was thought at distances of say three miles above the earth flying would be much easier. Today our knowledge of conditions at such altitudes is far superior and we know that the extreme cold, the scarcity of oxygen and the lack of buoyancy of the thin air would actually make flying most difficult. Air pilots also assure us that most birds fly less than 300 feet from the ground. Ducks, geese and shore birds are among the highest flyers, often traveling at altitudes above a mile. Many smaller birds have been reported migrating close to earth, or just skimming the ocean waves. At night the clarity of many bird-notes indicate that they must be migrating close to the ground.

The speed at which birds can fly has been greatly exaggerated. Most of the smaller birds have been timed during the last few years from automobiles and their average speed found to be between 25 and 35 miles an hour. The European Starling, one of the speediest of the small birds, reaches a speed of 45 to 50 miles an hour at least for short distances. The normal air speed of ducks and geese as measured by airplanes is from 40 to 50 miles an hour.

The greatest bird speeds are obtained by Swifts and Duck Hawks. The Swifts are well named and several species are probably capable of skimmering through the air at the rate of 100 miles an hour. The swoop of the Duck Hawk is one of the fastest things in nature. As it dives for its prey, it has been estimated with the aid of a stop watch to travel up to 180 miles an hour.

Actually during their migrations most birds average less than 100 miles a day as shown by the recovery of banded individuals and by observing the rate of progress northward in the spring. Shore birds seem to average from 80 to 90 miles a day, whereas small perching birds rarely average over 50 miles a day. The Grey Checked Thrush on the other hand progresses from Louisiana to northwestern Alaska, a distance of 4000 miles in about a month which is an average speed of 130 miles a day. In the Mississippi Valley the average rate of all the species is only 23 miles a day, a distance most of the species could fly easily in an hour but which more probably most of them cover as they feed from tree to tree or field to field. Strangely enough the speed of birds in Western Canada is much greater, often reaching 100 to 150 miles a day.

There are four main migration routes in North America which are known as Flyways. The Atlantic Flyway follows the eastern coast line to the foot-hills of the Allegheny Mountains. Birds from the Eastern two-thirds of Canada often fly eastward to the Atlantic seaboard and take this route to the warm southland. A few species fly nearly directly to South America from Nova Scotia with stops on some of the islands such as the Bermudas, West Indies and the Antilles. The Golden Plover is the most remarkable example of a bird making a long pelagic flight over the open sea. This remarkable bird breeds along the arctic shores of Canada. In the late summer the adult birds move down to Labrador where they fatten up on the crowberries. From there they leisurely fly to Nova Scotia. Then at the appointed time they take off on a 2400 mile hop to South America. In fair weather it is believed that they often make a non-stop flight as flocks have been seen flying over the Bermudas and even the Islands of the Antilles. In bad weather they have been known to stop off at some of these islands, however. The Golden Plover winters in the pappas of Argentina and returns north by way of Central America and the Mississippi Valley.

There are some fifty species of land birds breeding in New England, which follow the Atlantic coastline to Florida and thence many of them fly via the Bahamas to Cuba, Puerto Rico, and the lesser Antilles to South America. Others fly directly to Cuba or on to Jamaica, but only a few continue across the 500 miles of water to the South American coast as does the Bobolink.

The Mississippi Flyway. On no other continent is there a large river running due north and south. Such a land mark furnishes an ideal route for both water and land birds. The longest migration routes pass up and down this important traffic artery. Such birds as the Nighthawk, the Barn Swallow, the Black-poll Warbler breed in the far north in Canada or Alaska and winter in the Southern portion of South America, thousands of miles away. Most of the birds using the Mississippi Flyway fly directly across the Gulf of Mexico to Yucatan rather than going around the shores of Mexico. Ducks and geese fly down the Mississippi Valley in great numbers where most of them are concentrated in the coastal marshes of Louisiana and in Arkansas where great Federal Game Refuges help to protect them.

The Central Flyway follows the region of the great plains which lie just east of the Rocky Mountains, and passes down through Mexico and Central America into South America, for those species which go that far. The Harris Sparrow, whose breeding range in Northern Canada has only recently been discovered, follows this path to Oklahoma and Texas.

The Pacific Flyway follows the Pacific Ocean from Alaska into South America. The vast delta of the Yukon River in Alaska is the most important breeding ground for the water fowl which use the Pacific Flyway. These and most of the land species fly southward by an overland route which passes through western Alberta. At a point near the international boundary the birds veer westward across Montana and Idaho, southward across Central Oregon to the Interior valleys of California.

In spite of the large number of people watching and writing about birds, there are few subjects in nature about which we know so little as bird migration. Every nature lover should keep careful records of the time of the appearance and disappearance of each kind of bird in the fall and spring. Especially, should he watch for banded birds and report all such findings promptly and accurately to the Biological Survey. If one has the time and opportunity, there is no better way to help solve our ornithological problems than to operate a banding station.

FEATHERS

Floyd S. Carpenter

The most unique and distinctive characteristics of birds is their feathers, for all birds have them and no other creatures do.

Feathers are modified scales, and like them, and like hair, claws, and horns they are an outgrowth of the skin. Feathers, however, are the most highly developed and complicated of skin outgrowths known. They fulfill two distinct functions: first, they furnish a covering for the body, and second, they form the surface of the wings and tail which are necessary for a bird to fly. Because feathers are strong, light, and flexible and make an air-tight surface they are a perfect medium of flight.

Some birds when hatched are quite naked, while others are born with a downy covering. We all know how fluffy baby chicks and ducks are as they come from the shell; so are many other kinds of birds. Others, however, such as pigeons, herons, gulls, and many of our song birds, though they are hatched naked soon grow their down. Down is really a kind of feather, technically called neossoptile feathers. It is made up of incomplete feathers which are very different from other feathers, not in that they are soft, but because they grow from the tip end of other "final" feathers which are at first under the skin of the bird. As the final feathers grow out, the down wears off or at least breaks away from the end of the final feather, which is called the teleoptile.

A final feather is composed of all or some of the following parts: (1) the main shaft, stem, or quill; (2) an after shaft or branch stem which grows out from the under side of the main quill near its base; and (3) the webb or vane which is on each side of the shaft. The webb or vane consists of a number of branches or barbs which grow from the stem. From each of the barbs there are many still smaller branches called barbules, and finally each barbule may be fitted with hundreds of little hooks called barbicels. These barbicels fasten into each other to hold the vane tightly together as a whole. It has been estimated that there are nearly a million barbicels on a single feather from a pigeon's wing.

If one will examine a feather with a good magnifying glass, or better still through a microscope, these parts and the way they fit together can easily be seen. But please note that while a complete feather may have all of these parts, most feathers do not possess them all. Usually the main flight feathers in the wings and tail have no aftershaft, or at most only a small one. But they do have barbs, barbules, and barbicels, all of which are needed to make a stiff, smooth, air-tight feather needed for flying.

The body of a bird is usually covered with a layer of moderately still "contour" feathers which give it shape and protection and of course some warmth. But warmth is obtained chiefly by a layer of soft downy feathers just beneath the outer feathers. These soft feathers usually have no barbicels or in some cases even no barbules to hold them together.

Probably the simplest of all feathers is the filoplume, which is just the shaft or stem only, and it is so soft that it resembles a hair. Dr. Coues, a noted ornithologist, describes filoplumes as "What a good cook finds it necessary to singe off after plucking a fowl for the table." Of course feathers do consist of many combinations of the various and different parts.

Most birds seem to be completely covered with feathers, but actually the feathers grow out from only certain parts of the bird in definite areas or tracts and then spread over the body. A good comparison is a tree bordered street. The branches may extend over both the street and the sidewalks, yet the trees grow only from the strip of ground between the two. Many land birds have feathers that can be easily wetted by a rain. We all know what a wet hen looks like. But on the contrary some birds are not much affected by water. We know the saying, for example, "It is just like pouring water on a duck's back." It is literally true that water runs right off a duck's back, for though a hen has no rain coat, a duck actually has one. True it is not made of rubber or oil cloth, but it is made of oil. The duck carries, so to speak, its own oil can. This is a little gland on its back just in front of the base of the tail. When the duck preens itself it places the bill on this gland,presses out a little oil, and spreads it on its feathers, thus making them virtually waterproof.

While some birds have this oil gland more or less developed, it is most conspicuous and enlarged on water birds. The feathers on the breast of some birds, such as the grebes, often known as dy-dippers or hell divers, are so well oiled that they are quite greasy to touch. This oil so waterproofs their feathers that water not only does not wet them but does not even get between them. Therefore the grebe has a large air case around his body, making it so bouyant that it floats high on the water. Please note that it is floating, as a boat, and not swimming as a man does who moves through the water to make it lift him. But if danger comes,our grebe can pull its feathers close to its body, so close that it reduces the size of the air cushion, and it therefore settles deeper in the water. At times it floats so low that only the top of its head is above the surface.

Feathers are alive only when growing. During the period of growth the quill is open into the skin of the bird and is full of a sort of pulp. As soon as growth ends, the quill closes, and the feather is dead but by no means useless. In most feathers the period of growth is comparatively short,and then the feather remains in place until it is replaced by a new one at the next moult.

There are a few cases where feathers grow continuously; these are usually rather dry to the touch,and the outer end from time to time comes off in a powdery form. This kind of feathers, called powder down, is found chiefly on different parts of some of the hawks, parrots, herons, woodpeckers, and partridges and quails.

Except for the unusual powder down feathers which grow continuously,most feathers develop at definite times of the year. The loss and growth of most feathers are called moult, and the birds are described as being in different plumages.

Let us take, for example, a young male scarlet tanager. When first hatched it is quite naked but soon becomes covered with down. Then begins to grow some feathers, only the bare quills of which are visible, but by the time the baby tanager is a month old he is covered with yellow and olive colored feathers broadly streaked with gray on the breast and sides. He is now dressed in what is called "juvenile plumage." In late summer or early fall he loses some of these feathers by moult and shortly he emerges in a yellowish-green coat with brownish-black wings and tail, and there are no gray streaks on his body. This is called the "First Fall and Winter Plumage." The next March and April the feathers moult again, and the bird appears in his "First Nuptial Plumage." His body becomes a beautiful scarlet, sometimes pale or mixed with orange. But often some of the old greenish feathers are left over, and the bird looks like nothing you ever saw before in this peculiar mixture of colors. But just wait. By the second winter our tanager

has jet black wings and tail which are quite a contrast to the brownish black of the first winter. He has lost all of his old feathers, and by the time the second spring arrives Mr. Tanager comes forth in all his glory with his exquisite vermillion body and black wings and tail. He has attained his "Adult Nuptial Plumage," and we all agree that he has every right to be proud of his splendid coat.

But what happens to the poor female? Alas. After her "juvenile plumage" she takes on her "first fall and winter plumage," a plain greenish yellow. Although all her feathers are completely renewed each fall and partly each spring, she must wear the same color and the same pattern all her life.

Although Mr. Tanager was two years old before he looked just like his parents, some birds are scarcely distinguishable from the older birds at the end of one year. On the other hand others, such as the swans and eagles, require three or four years to attain their adult plumages.

The moulting period is a hard time for wild birds, and usually they are rather inactive during that time. Nature in order to protect her creatures, usually allows them to replace only one or two feathers in each wing at a time, to enable the bird to continue to fly, corresponding feathers in each wing are replaced simultaneously. In the ducks and some other water birds, however, there is a notable exception. Late in the summer, after the young ducks can swim, the parents usually go to some large body of water prior to their moulting period, for they unfortunately lose all of their wing feathers at once and for a short time are unable to fly at all. Hence they seek safety by spending their time on the water so that if they are attacked they can dive out of sight. To protect the normally brightly colored male, nature gives him his dull "eclipse plumage." But as his new feathers come out and his power of flight is restored, he regains his usual colorful coat.

There are, of course, many variations in the sequence of moutls; the examples given are only a few.

A few birds acquire special feathers during the breeding season. Of these, the egrets are well-known examples. Their long fine plumes, called aigrettes, which they wear only during the nexting season, almost caused the extinction of these beautiful birds. Some years ago these plumes were in such great demand to decorate women's hats that the birds were slaughtered in tremendous numbers. Because the aigrettes were useful for commercial purposes only when fresh, and they were fresh only at the beginning of the nesting period, the parent birds were shot off their nests for the feathers, and consequently the young in the nests were left to starve. Fortunately the country was sufficiently aroused at this outrageous cruelty that strict federal laws were enacted and enforced, and after a period of many years the birds are now showing an increase in number.

The color in birds' feathers is a very interesting thing to know about, too. While most of the color in feathers, particularly the reds, yellows, browns, and blacks, is due to pigment, or coloring matter, some feathers get their color from refraction of light. We know how a prism splits a sunbeam into the colors of the rainbow, or how a little oil on top of some water gives a bright color. Also, if you will hold a phonograph record so that a bright light will shine from it to the eye, at certain angles a sort of rainbow may be seen. This is caused by the fine lines on the record acting as prisms separating the light into its component colors. Now some feathers do the same thing. That is how we see bright irredescent colors on the neck of the pigeon.

But a still stranger case of refraction is found in ordinary blue feathers. Actually in all native birds which have blue in their coloration there is no blue pigment in the feathers; usually it is brown or black, and the blue is due to a refraction from the surface. As proof, find a blue feather - natural, not a dyed one - blue jay's feathers are often lying around. Hammer it or mash it. You will find that as its refracting surface is destroyed the feather soon ceases to be blue and appears a dirty black or brown.

Some birds seem to change their color without moulting, but such a change is usually due to the wearing off of the edges of the feathers. Suppose a feather has a white center with a narrow brown border. If the border is completely worn off the feather will be solid white. Let us go a little farther and take a bird which right after the moulting has white feathers with wide brown borders. These feathers are so laid over each other, like shingles, that only the brown borders show, and the bird appears to be all brown. Gradually the brown edges begin to wear off in spots, letting the white show through from underneath, and the bird takes on a scaly appearance. Finally, as all of the brown borders are completely worn off, and only the white feathers remain, the bird becomes solid white. Now this is exactly what happens on the breast of the male Snow Bunting, a little fellow about the size of an English Sparrow. It winters as far south as the northern part of the United States, but for the nesting season it goes to the arctic regions. In the winter it is all white and blends beautifully with the snow; during the nesting period it has a good deal of brown and blends nicely with its nest.

The variations in the color and the markings of birds are many, too. Some are very bright and conspicuous, some subdued and well protected; some are of one color only, while others are multi-hued; and many are streaked or spotted or possess other special markings.

When the male and female have different markings it is usually the male that is the brightest. It is thought that he uses his brilliant and beautiful colors to help him win his mate. Also he can attract enemies away from the nest while the female in her dull and subdued coat is well protected from them because she cannot be seen. There are a few exceptions where birds are like people in that the female is the most gaudy. It is interesting to note that in these species the lady behaves differently, too, from the normal bird. Every year is leap year for the brightly dressed female,for it is she who does the courting,and after selecting her mate she lays the eggs and then leaves all the incubation and brooding and feeding of the young to her husband. One exaple is the phalarope, a wading and swimming bird somewhat smaller than the robin. A few migrate through Kentucky at times, but they nest cheifly in the far north. Many of them have the habit of spending their winters on the open ocean far from shore, feeding from the surface by day and sleeping on the water at night.

Some birds are protectively colored, and they often seem aware of the fact that nature has thus taken care of them. The Wilson Snipe and the Woodcock, which spend much time in grass or thickly grown localities, are so colored and streaked that they blend perfectly with their backgrounds,and as long as they remain still they are almost impossible to see. This they seem to realize, for often they will remain quite still even if a person passes very near them; sometimes they will not fly until almost stepped on or until they can tell by some action that they have been discovered. Brightly colored birds, on the contrary, fly away long before a person can approach them.

There is another kind of protective coloration that acts in a rather strange way. Meadow larks, Juncos, Vesper Sparrows, and a few others have white outer tail feathers which are very conspicuous while the bird is in flight. A watching enemy can easily follow his path. But the moment the bird alights, it folds its white feathers completely out of sight, and suddenly the bird has disappeared. Such marking as this is called a "banner mark."

One of the queer things that one often wonders about in protective coloration at first is why a good many birds, such as the wood thrush and the shore birds have dark color on top and are quite light underneath. At first it seems hard to think that this is of any value to them. In fact, we are inclined to believe that it makes them more conspicuous,but that is not the case. Shore birds usually spend much of their time in shallow water or on the sand which is somewhat the color of their backs. This light part underneath tends to lighten the shadow which they cast and therefore makes the bird on the whole less conspicuous than if it were uniformly colored. One can easily perform a simple experiment to prove that this is true. Take three good sized potatoes and put a pair of nails in each to represent the bird's legs. Leave one of the potatoes in its natural color. Then take some white chalk and color one of them white underneath and the third color white on top. Place them in a row and step back twenty or thirty feet and see which one shows up the plainest. It may be a surprise to find that the one with the white top is quite plainly visible, while the one with the ~~w~~white underneath is much the hardest to see.

Have you ever discovered a mother killdeer leading her babies through the low grass? As they move along behind her, you can count the number of the brood and admire these fluffy little bits of feathered life. Then you decide you want a closer look and follow them. But as soon as Mother Killdeer becomes aware of you she utters a faint call of warning to her chicks, and suddenly all you can see is Mother Killdeer running off in the hope that you will follow her. What has become of her babies? They have heeded the warning cry and apparently have flattened out on the ground remaining quite still, for presto, as if in obedience to a magician's wand they have absolutely vanished.

BIRD FLIGHT

Floyd Carpenter
Beckham Bird Club

From the earliest ages the flight of birds has been of great interest to men and caused them to wonder how it was done. One of the wisest of all men, Solomon, said, "The way of an eagle in the air is beyond my understanding," and less than a century ago one of the greatest physicists of all times, Lord Kelvin, when asked to explain bird flight replied, "That which puzzled Solomon puzzles me also."

Many attempts were made to build flying machines. Unfortunately the builders had no real idea of flying and usually tried to build what resulted in a crude imitation of a pair of wings and a queer tail something like the Gump in the marvelous Land of Oz, and for power the arms and legs of the aeronaut. They were, of course, failures. The inventors were not all crazy, however, for Leonardo da Vinci built one of these unsuccessful flying machines.

Birds have been defined as warm-blooded animals which are covered with feathers. Both of these points are of the greatest importance for flying. Birds are warm blooded, their normal temperature being from two to fourteen degrees higher than that of man, depending upon the species. It is a well known fact that chemical changes take place more rapidly at high than at low temperatures. A person with high fever loses weight rapidly due to the increased rate of metabolism.

Now a bird with its high temperature can assimilate its food faster than a man, and although people speak of eating as little as a bird, that is a poor comparison. Actually a bird each day will eat from half to its whole weight in food, and it is food that furnishes its power. Thus a bird has a large power plant in proportion to its weight, and is therefore capable of producing the great power required for flapping flight.

Feathers are also very important for flight for they make a strong, smooth, flexible, light, and air-tight surface for the wings and tail. They also have the dual function of clothing and streamlining the bird.

The skeleton of a bird is splendidly adapted for flight. The wing and other bones are hollow to give maximum strength with minimum weight. The breast bone of birds which do more flying by flapping their wings, in contrast to that of birds which fly chiefly by gliding, and even more so to flightless birds, has a deep keel to which the muscles which pull the wings are fastened. These muscles, which we may compare to the engine in an air plane, are so large that in an ordinary pigeon they weigh as much as all the remaining part of the bird.

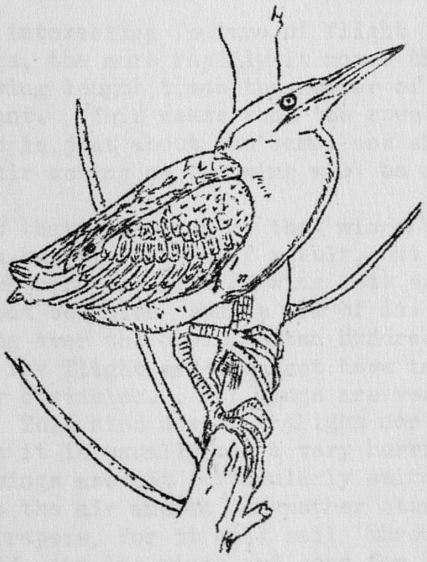
There are three different types of bird flight. The first is gliding. In this form the bird holds its wings extended, and without moving them coasts down hill on the air. To rise, it must flap its wings. The second type is soaring, and for this method of flying a bird makes use of rising currents of air to gain altitude and then glides downward when out of these currents. These rising air currents are caused by the wind blowing over a hill, against a ship at sea, by uneven heating of the air, or by clouds. The third and most common method of flying is by moving the wings or by flapping. The wings thus act both to support the bird and to move it forward. This is really the most complicated method, and as long as man tried to build flying machines of this type of flight he failed.

Later when the first gliders were tried, and this was considerably before the Wright brothers began to fly, he had some success. Still later after the first World War, when Germany was not permitted to have any power driven planes the Germans went into gliding and soaring flight so earnestly that they learned to build better and better gliders and learned how to find and use rising air currents. In our own country some people have been able to stay aloft many hours and fly many miles in these gliders which are simply air planes without engines or propellers.

Flight by flapping is a very complicated process. No wonder the young birds have to practice so much to learn to fly. The usual idea that a bird moves its wings up and down is shown in many of the earlier pictures of birds. Actually that is wrong, for the main movement is in general down and forward, then back and upward. It is rather easy to understand why people at first did not discover this, for birds make from two to two hundred wing strokes per second. Except in the case of large birds which move their wings comparatively slowly this motion is too rapid for the human eye to follow in detail, and all we see is a general summary of the motion. A swiftly running horse is a pretty sight, but if it could be instantly stopped in several parts of its course, it would look queer and unnatural to us in these positions, simply because we never see it still in that posture.

The same thing is true of bird flight, only more so, for it was not until the advent of high speed cameras that we could "stop" the motion of wings in various positions. But to be just, we must say that in the whole world there was one small class who successfully and accurately stopped this motion before the days of photography; these were the Japanese artists. They stopped the motion so well that their pictures seemed very strange and were criticised as being unlife-like; however, the camera today shows that they were right.

As the wing is pulled by the great breast muscles, downward and forward relative to the body of the bird, the air resists this movement and pushes up on the wing, lifting the entire bird. If a person watches a bird with large wings and a slow wing beat, he can plainly see that each time the wings move downward the body of the bird rises noticeably. The Herring Gull, which is seen on the Ohio River during the winter, and the Green Heron, more commonly known by the names of Fly-Up-the Creek and Shikepoke, both show this plainly.



The question naturally follows that if this down stroke will raise the bird, why won't the recovery or up-stroke drop it. It would, except for the wonderful way in which the feathers are placed in the wing; on the down-stroke they tightly overlap each other and form a solid surface, but on the up-stroke each feather partly rotates on the quill so that each individual feather is moved edgewise through the air, thus causing little resistance and therefore correspondingly little downward force to act on the bird.

A crude comparison is a venetian blind: if closed tight it would be hard to move through the air, yet if it was opened as to let in light it would move easily because the air can pass readily through the open slats. Again let us take rowing a boat and feathering the oars. While pulling forward the blades are at right angles to the water; as they are brought backwards they are rotated about ninety degrees and are parallel to the surface of the water, thus decreasing wind resistance. Any one who has ever rowed against a strong wind well knows how much difference this turning of the oar makes.

This rotating action of the wing feathers can be explained by the quill being to one side and not in the middle of the feather. The vanes on the two sides of the quill are of unequal widths, and the feathers overlap so that the wide vane of one feather is underneath the quill of the adjacent feather. Then as the wing moves downward, the air presses the feathers tightly together, but on the upstroke more air presses on the wider vane than on the narrower one and thus tends to rotate the feather. As there is no supporting quill to prevent this movement, the feathers open up edgewise and pass readily through the air. If one can look at a simple diagram of this it is plainly seen and proves the old saying that one picture is worth more than ten thousand words.

Another proof for the different effort required to raise and lower the wings is demonstrated by the size of the muscles. The ones which pull the wing down are enormous, and as we have already mentioned, in some birds weight as much as all the rest of the bird; the muscles which raise the wing, however, are quite small in comparison.

While in general the movement of the wings is downward and forward on the "power" stroke to emphasize the work done, then upward and backward on the recovery, these movements must not be considered to be in a straight line. Actually the movement of the wing tips as shown when traced by high speed photography is a series of rather strange loops.

Another interesting feature of flight is that the smaller the bird and the shorter its wings, the more rapidly it moves them. The final result is that the product of the wing length times the number of beats per second in many species is nearly a constant. This means that the speed of the tips of the wings of various kinds of birds is just about the same, and since this is true the intensity of the force of the air acting on the wing will be about the same amount per unit area.

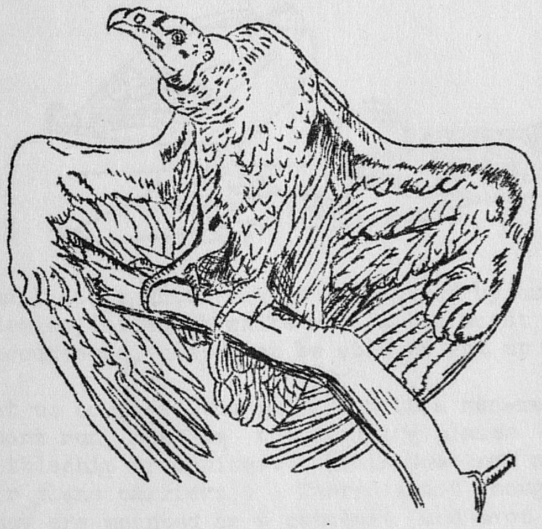
The fact that the shape of the wings of various species of birds varies greatly is not a haphazard sort of result, but rather it is the gift of a kind Creator to give each bird the kind of wing best suited for its life. Now take the Albatross. This great sea bird spends all of its time, except during the nesting season, on or flying over the ocean, often hundreds of miles from land. Thus it has plenty of room for flight and does not have to worry about bumping into trees and bushes or other obstacles. Its wings are very long and narrow and taper to a gradual point. This bird does not alight nor leave the surface of the water very often, and then it is usually not a very hurried start. That is fortunate, because long narrow wings are not particularly suited for quick starts, but let the bird once get into the air and it is another story. It is like the daring young man on the flying trapeze, for it will sail through the air with the greatest of ease; it will hold out its wings and soar for hours, for the long narrow pointed wings give a great amount of life with very little resistance.

Other birds which spend a large part of their time in flight are the Swift, the Swallow, and the Night Hawk. These, too, have long narrow wings, but unlike the Albatross they fly by flapping. As an explanation, the albatross flies by soaring, and a bird which travels in this manner must first of all pay attention to where the currents of air are rising and then govern its flight accordingly. Mr. Albatross is looking for food on or near the surface of the water, and as the location is more or less fortuitous the bird goes where the air currents will permit. Now contrast this to the swift, swallow, and night hawk. They are busily engaged in catching insects as they dart through the air. That is why they make so many quick and sharp turns, and they cannot depend on going where the rising air currents permit; they have to go after the bugs for food and must go wherever they happen to be. They must have their own power plants, in the form of their flapping wings. But since they spend most of their time in the air good flight is of prime importance to them, and thus exists the need for the long narrow pointed wings.

Tests in wind tunnels and in man-made gliders prove that this shape of wing is particularly suited for soaring flight, especially when carried out at the speeds used by birds.

Some birds spend a large part of their time on the ground or near it, and in the duration of a day make a number of short flights; at times they have to be able to start very quickly to escape some enemy. Besides that, they must fly through thick underbrush and make sudden turns. Such a bird, to survive, must have wings suited for this kind of flight, therefore they possess a comparatively short, deep wing with blunt ends.

The vultures, represented in Kentucky by the Black Vulture and the Turkey Buzzard, and some of the hawks spend much of their time in the air but not so much as the swifts. They need the type of wing that is reasonably good for soaring, that can start without undue effort, and is not too big to permit the bird to get in or out of moderately dense or open woods. Moreover they do not have to fly very fast or make quick turns. The wing suited for these purposes is one that is fairly long in proportion to its depth and square at the tip. Please note that being square gives it appreciably more area for the same length and width than a pointed wing. Thus the requisite wing area needed to carry the bird is obtained without making it too long for its environment.



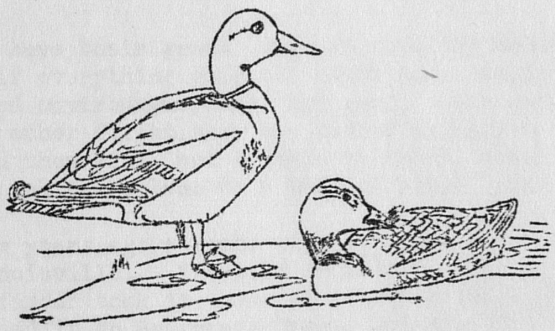
But if we look at the end of this wing, we observe that it is not smooth, but individual feathers project out like fingers. Again this is not just a defect caused by the feathers not meeting, as was first thought, but actually nature has gone to considerable trouble to help the bird in this way. These slots or spaces are caused by the outer ends of the end feathers being much narrower than the inner ends. Lt. Commander R. R. Graham of the English Navy,

published a very interesting paper on this subject in the Smithsonian Report for 1932 entitled, "Safety Devices in Birds Wings," which explains these slots.

He found that the birds and also for man-made planes those with long, narrow, pointed wings do not stall easily nor lose as much of their lift when at abnormally steep angles of incidence as do wings which are short and deep. Short and deep wings may lose so much of their life at steep angles of incidence that they may stall and then fall. But there is a strange and curious exception. It is when there are slots at the end of the wing that the life of these precarious angles and at slow speeds is far greater than it would be if these slots were closed over. So after all, these slots are present not just because the feathers did not overlap, but rather because the ends of the feathers were narrowed so that they would not overlap and make slots for better and safer flight. Many man-made planes have slots which the pilot opens when landing or taking off to give the plane greater lift and safety while in this critical position and when traveling at reduced speeds.

Since many years of flight by man-made planes had passed before the value of these slots in birds' wings were recognized as such, it is possible that there may be still other feathers in birds' wings which man does not yet know about and which may later be found to be useful in planes.

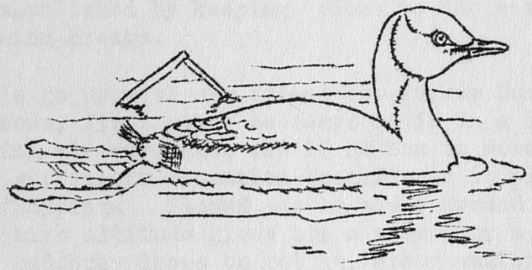
There has to be a start for everything, and that is true about each single flight, whether of bird or plane. In order for a wing to lift a body, it must be moving through the air with at least a certain speed which varies greatly with different wings and loads. A small bird, such as one of the sparrows, gives a jump at the same time it starts using its wings and thus acquires the minimum velocity which is needed. Mallards and other ducks which live near small pools of water can give a mighty spring which together with a tremendous wing movement will take them almost straight up into the air for perhaps as much as twenty feet, and then off they go. This quick vertical leap is necessary for them as they spend much time in small pools which may be surrounded by small trees or bushes, and to escape their enemies, of which white man is the worst and most destructive the ducks have ever encountered, they must be able to get up and over and away very quickly.



Let us compare the mallard with a man-made plane which must start with only a short run, such as the scouting planes which are launched from the deck of a battleship or cruiser. (This does not apply to flights made from the more roomy air plane carriers). There is not enough room on deck for the planes to run, so they are mounted on a catapult and shot into the air with tremendous velocity. This catapult corresponds to the big push the mallard gives with its legs and mighty wing movement. This first movement is so vigorous that the bird can continue it only a few seconds.

Let us see how the ducks which spend their lives on large bodies of water start flying. Until the advent of white man and his fire arms these birds had comparatively few enemies which could injure them while they were on the water, and there was no great need to leave quickly. As a result they face into the wind to get greater air speed without having to move so fast over the water as they would if they started with the wind. (An air plane always does this wherever possible.) Then facing in the correct direction they start in with a vigorous movement of their wings and feet and start planing over the water. As they travel faster and faster they ride higher on the surface and after a run of perhaps a hundred feet or more they are in the air and in full flight. An air plane, whether a sea plane or land plane, takes off in the same manner.

Some birds, such as the grebes, sometimes called die-dippers or hell-divers, are so specialized that they have to start flying from water. They are totally unable to start from land. They are expert swimmers and divers, and part of this ability is due to the fact that their legs are placed very far back on the body in such a position as to give a powerful stroke for swimming. But alas, they are so far back that the bird cannot stand up on land. It rests on its breast and shoves itself along that way. Normally this is no hardship because the grebes hardly ever come to land. Even their nests are usually built on floating mats of vegetable matter or else right at the edge of the water.



They have their great swimming ability because of a specialized body and legs, and if everything goes all right and nothing upsets them from living in their required environment, well and good. But suppose that while migrating or when on some other flight, they are forced to alight on land; then because of their strange build they will not be able to start again and may starve to death before they can push themselves to a body of water large enough to start from.

A few years ago a grebe was found on one of the sidewalks in the Highlands section of Louisville. The bird could not fly but seemed otherwise in good condition. The finder took it to an amateur ornithologist who solved the mystery. He simply carried it to Beargrass Creek, put the bird on the water, and immediately it flew off without any difficulty, even though it had been totally unable to fly away from the sidewalk.

If you should happen to surprise a flock of turkey buzzards on the ground feeding on a dead animal, they will probably do two things. First, they will disgorge the food they have just eaten to lighten themselves in order to fly more easily. Then they will start an awkward running and jumping gait and with beating wings take to the air. At first they will flap their wings and at last start soaring. This is an abnormal take-off.

Usually when resting, buzzards perch high in a tree, preferably a bare one, near the top of a steep hill or cliff. The bare tree is desirable because it gives them more room for flying. Then if the tree is high they often start by diving off to the side. Air speed is thus rapidly gained, and they zoom up and soar off with hardly a flap of their wings.

The normal speed of birds through still air varies greatly. Until about fifty years ago the speed was thought to be very high. This was because it was determined by what the person thought the bird ought to fly to cover certain distances in migration. Later results determined by direct measurements, such as driving alongside in an automobile and watching the speedometer, timing the passage of the shadow over a measured distance, and by following in an airplane, show the speed to be less rapid than was originally believed. Some birds fly as slow as twenty miles an hour or even less. The average small perching birds such as robins, fly at about 30 miles an hour; ducks and geese attain a speed of forty to sixty miles an hour. But the record for fast flight goes to the appropriately named Swifts. They have actually been timed at 180 miles an hour.

The height at which birds fly varies greatly and is done purposefully. Take, for example, the Stormy Petrel, or the Mother Carey's Chickens of the sailors, a bird about the size of an English sparrow. It spends much of its time at sea often far from land and feeds by snatching choice morsels from the water as it flies along. For such feeding it has to fly low and is often only a foot above the waves. In time of storm it still can fly into the face of the wind. This is accompolished by keeping close to the water and letting the waves themselves act as wind breaks.

Let's go up with our friend the Turkey Buzzard. He usually flies high for two reasons, first since he soars he is in a better position to take advantage of the rising air currents, and if he has to move from one rising current to another he has sufficient elevation to glide to it without coming to the earth or resorting to flapping. Second, as he sails around looking for carrion on which to feast, the high altitude gives him a view over a larger area. If he discovers something and suddenly drops to get it, other vultures perhaps in the far distance will see his descent and knowing what that means come over to the party. Thus when one vulture discovers food it is not long before the hungry ones for miles around know it and come to share it with him whether invited or not.

The swifts at times fly at very high altitude in their pursuit of bugs.

The South American Condor, a vulture with a wing spread of nearly ten feet, has been seen at 20,000 feet above sea level. The greatest estimated height I have heard of is that of geese flying in India, at an estimated height of 29,000 feet. This was observed when an astronomer was photographing the sun and a flock flew between the sun and the telescope just as he took the picture. They showed on the plate, and the size of their image as compared to their actual size was the basis for computing their altitude.

The American Egret, often erroneously called the white crane, measures about four and a half feet from wing tip to tip. The writer once had the pleasure of seeing a flock of about twenty of these birds start on what was probably their migratory flight back to the south at the end of summer. These birds spiralled upwards to such a height as to be almost invisible even when seen through a pair of eight-power field glasses. This at the least must have been many thousand feet.

The distances birds fly in a single flight are quite variable. Some birds such as the penguins, ostriches, and others are unable to fly at all. Many of our smaller birds confine their flying, except during migration, to many or to a few short flights. All of us have seen some of the flycatchers, for example the Wood Pewee and the Phoebe, perched in a tree watching for a passing insect and then making a short dart after it and return to the same spot to wait for another morsel.

The swallows and swifts spend hours at a time in swift flight after countless bugs. These are some of the faster birds and may often go more than fifty miles per hour; since they frequently spend several hours in flight without alighting, a hundred miles without a stop is not unusual for them.

But most birds are not so aerial in nature, and as a whole, the longest flights are made during migration. In recent years much has been learned about the movements and travels of birds by banding them. It has been found that some migrate rather leisurely, just feeding a while, then moving on to the next attractive bird restaurant, eating a meal there, and then going to the next, and so on. Thus their trip consists of many short jumps.

Others make a comparatively long flight and then rest a few days before moving on. Many of our small land birds, however, make a non-stop flight of from five to seven hundred miles across the Gulf of Mexico as they go to and from Central or South America. Most of the Warblers, the tanagers, bobolinks, and many others including the smallest of all birds to be found in Kentucky, the Ruby-throated Hummingbird, make this seven hundred mile trip across the Gulf. If they encounter bad storms, many of these little creatures are killed.

The Golden Plover, which is about the size of a well-known Killdeer, about 10½ inches long, is probably the world's champion non-stop flyer. In the fall these birds gather in Nova Scotia and become very fat from feeding on berries. Then one day they take off for South America, 2500 miles away. They fly over the ocean without a stop, and about two days later arrive on the coast of Venezuela and Guiana. But they are no longer fat. They have used all that fat for fuel for their strenuous flight and have become quite thin. So they rest here for a while to regain their lost flesh and then set out overland for Argentina where they spend the winter. The return trip, however, is made by easy stages through Central America and the Mississippi Valley to Canada and then to the Arctic Ocean for nesting. A very few, however, make their southern trip through the Mississippi Valley.

Different species and genera of birds have certain characteristics in their flight which are an aid to identifying them. Both the Turkey and the Black Vultures usually soar, but at times have to resort to a few flaps of their wings. The Turkey Vulture makes long slow flaps, while the Black Vulture makes quicker and shorter ones.

Most woodpeckers have the habit of making a few wing strokes and then folding their wings for part of a second before making wing strokes again. This produces an undulating flight. The goldfinch also undulates in its flight, but the use of its wings is continuous.

The sparrow hawk while hunting a mouse will face into the wind and with drooping tail but rapidly beating wings will hover in the air in one spot over the ground for a long time. When Mr. Mouse comes into the open the hawk will suddenly drop on it with great speed.

The Hummingbird moves its wings so rapidly that they look like a misty blue, but it is a master of control. It approaches a flower, and while hovering in the air puts its bill deep into the flower to feed; it is not perched on the flower or on the stem, but by its rapid wing beat keeps itself in position. When it has finished it backs out, actually flying backwards. The hummingbird is the only North American bird which can fly backwards.

The control which birds have of their flight is marvelous and is due in no small measure to their excellent eyes. Watch how a barn swallow darts through a tiny opening, or how another bird alights on a tree amid leaves and small branches. But in spite of their marvelous ability, many are dashed into obstructions during severe winds.

If one is fortunate enough to be on top of a high steep hill around which Turkey Vultures are flying on a windy day, he can see much of how a bird controls its flight. The brisk wind blowing against the steep hill makes strong rising currents of air which are suitable for soaring, and the vultures well know this. They wheel around through the air and often skim not far over the top of the hill, flying fast if going with the wind but very slowly if going against it. If the observer is concealed the birds may come quite close to him. He can then see that to balance themselves the birds warp their wings, change the angle of incidence, open or slightly close their wings, raise, lower, and twist their tails and at times move their heads and necks to balance themselves. It is all done with a wonderful and rapid dexterity.

Sometimes a hawk or vulture makes a rather steep dive; when doing this it of course travels much faster than usual. As wings lift more when traveling at high speed than they do at low speed, the full area of the wing is not required during the dive. In fact the full area just adds more resistance and so slows the dive. The bird instinctively knows this, and so to offset this resistance he partly closes his wings, and the speed is thereby increased.

There are many other lessons of flying to be observed in birds. A bird on alighting may place its tail at a steep angle and hold its wings up to act as a brake; in this case it is an air brake even if entirely different from the one Mr. Westinghouse made. Long legs and necks are used for balancing, too.

In warfare, airplane pilots go to great pains to keep the enemy from attacking from above and toward the defenseless part of the plane. They have devised many manoeuvers to extricate themselves for such perilous positions and be able to fight back. The Kingbird, which is a little smaller than a robin, is a swift and courageous creature which takes fiendish delight in attacking hawks and even eagles. It may be compared to a tiny pursuit plane attacking a hugh bomber. In the old days of the previous war most planes could shoot forward only, and we will assume it is that kind of plane. The small plane always attacked from above and behind where it could hurt without being hit itself. Now that is just what the kingbird does; it swoops down, pecking at its hugh opponent; it may even succeed in knocking out a few feathers and finally makes such a nuisance of itself that the hawk or eagle flees from this tiny enemy.

Hawks, too, fight each other in the air, and their attack is by flying onto their opponent, their legs stretched forward and downward, and their great claws spread wide. Woe to any creature they hit. On two different occasions I have seen two Red-tailed Hawks fighting in the air. One after being out-manoeuvered was about to be attacked from above and behind. The lower one, instead of being whipped, did a most remarkable thing. It quickly turned over on its back and flew upside down. This was done by gliding, and it had to descent at a rather steeper than normal angle, but it was still flying and flying under control. As soon as it was upside down, its claws and feet were outstretched, and the two hawks were on an equal basis, for if they hit, each would be dealt the same blow, and it was claw to claw. The upper hawk recognized this defense and decided not to meet the lower one, but veered off to the side. The lower one rolled back and was then in a position to manouver again. The manouvers carried them out of my sight before I could tell what the final outcome was.

BIRD FEEDING DURING THE WINTER MONTHS

By Mrs. F. W. Stamm
(Vice-President-Beckham Bird Club)

It is only in winter when birds may actually need our help. They do not suffer from the cold as long as they have sufficient food and are probably just as comfortable out of doors as we are at our fireplaces. It is primarily when heavy snows cover the wood stalks or ice envelops the trees and conceals the insects larvae that we may come to their aid and save them from starvation.

Birds have long been protected for the charm of their songs, their friendliness and very interesting habits. They also deserve careful fostering by man because of their economic usefulness.

First let us consider the free service the birds render us when they return in the spring. We don't pay for it. It is as much taken for granted as the air we breathe. And it is very important.

A current writer, Mr. S. Dillon Ripley, tells of a comprehensive survey which was made in one of our southern Atlantic states. The early crops were being damaged by a small insect known as the "wheat aphid." This little insect had the situation so well in hand it was a question whether there would be anything left of the grain crops. That was in March.

By April the spring migration had started. Soon the Warblers, Orioles and Sparrows began to arrive. By mid-May they had gone, but other birds replaced them and stayed to nest and rear their young all through the early summer. The effect on the aphid was unbelievable. The survey estimated something like 90 billion aphids alone were being eaten daily in that state. That means that the total consumption for three months would be enough to make a solid wall of aphids 15 inches high around the earth at the equator.

These figures sound startling! But they are not. Every year in the early spring the birds have a marked shift in their diet. Experts on the subject say it is a desire for proteins. Whatever the case may be they eat more animal foods. In the instance just mentioned it happened to be aphids. We should not forget that many other injurious insects such as wireworms, leaf hoppers and pillbugs were being eaten at the same time along with many others, such as caterpillars.

No one who has observed the endless activity of birds in feeding their young can doubt that the destruction of insects in this way is enormous. Perhaps the champion feeder is the common House Wren. His food is 98% insects. It is estimated that he brings food to his young once every two minutes all day long. Only the insect's enormous powers of reproduction enable them to survive the terrific warfare waged when the parent birds are searching everywhere to feed their young.

I think the casual observer is aware of the importance of Spring and Summer birds as destroyers of insects. But few of us realize the importance our Winter birds play in our annual defense program against these injurious pests. All Winter long they wage an active warfare against larvae and insects. Likewise the birds known as "seed-eaters" consume tons of destructive weed seed which otherwise would be spread over the country and add greatly to the cost of our farm and garden corp. These winter birds are powerful allies of the farmer. The Brown Creeper hunting insects' eggs, the Woodpeckers digging out grubs, Tree Sparrows feasting on de-

structive weed seed are all doing their part in this warfare to save forests and crops. The woodpeckers are the chief defenders of trees against insect attack and most of them are specialized to feed upon woodboring larvae. Their economic value is most evident on the farm and it should be most appreciated there.

Many of us have some garden spot even tho it may be a 2 X 4 on a city lot. What a difficult time we have fighting weeds. It is a constant struggle. Work as you will you never get rid of them. But here again we can be thankful for some birds eat weed seeds almost exclusively. The seeds of the plants that cause so much trouble are their cheif food in winter.

Consider the Tree Sparrow. He feeds about farmsteads, preferring open country to woodlands and seeks the companionship of man for the food material he scatters and wastes. They come to farmhouse doors for seeds and chaff, thrown out for the birds by kindly people. The Winter habits of the Tree Sparrow are as an open book to all rural residents, who feed birds during inclement weather. The late Prof. Beal, an authority on the foods of birds, worked out the annual consumption of weed seed eaten by the Tree Sparrow in the State of Iowa to be 875 tons, or enough seed of various kinds of destructive weeds to sow over a good deal of the Eastern States. Does this sound unbelievable? Prof. Beal tells us that these figures "unquestionably fall short of reality."

How many farmers realize what an invaluable worker they have in this little grey-brown streaked bird? Just one kind of sparrow prevents nature from sowing these seeds. This bird inhabits our state. Is not this one specie alone worth his board and keep? How little it means to us to scatter grains and table scraps during inclement weather and how much more it means to the birds! "Cast thy bread upon the waters for thou shalt find it after many days."

Another bird we are fortunate to have all the year round is the friendly Chicadee. He is such a cherry little fellow, a most welcome winter resident, and an important agent in destroying injurious insects. Only those who have studied his diet known what he is doing for us.

The Chickadee goes where other birds do not and visits every crack and cranny in which insects hibernate or lay their eggs. The chickadee finds insects and their eggs at a time when they are in a dormant state in the cold of winter or early spring. To destroy or kill at this time means preventing it from laying more eggs or hatching out when the warmer weather comes. One unusual habit of this little bird is worthy of mention. The chickadee is one of the few birds that picks the wax coating off the seeds of poison ivy, leaving the seed to shrivel and die. People allergic to this poison vine should consider the chickadee a worthwhile friend.

An interesting study of the economic value of this bird was made by Mr. Forbush, ornithologist of the State of Massachusetts. In one section of this state, the cankerworm was seriously injuring the apply orchards. This well-known ornithologist invited the chickadee to be his guests in an old orchard during the winter. Various types of foods were placed at their disposal but this did not prevent the birds from foraging on their own account. The eggs of the cankerworm and tent caterpillars formed their principal diet. The next spring "the trees bore luxuriant foliage during the entire summer and produced a good crop of fruit."

The adjoining orchard was also protected by the birds--but elsewhere in town most of the apple trees were defoliated and very few produced any fruit. This surprising record gives us some idea of what the chickadee is doing for us. He renders invaluable service to agriculture and forestry.

It was estimated that from March 20 to April 15 that a single chickadee might destroy as many as 5000 cankerworm eggs in one day.

And so we could go on and on. The food habits of a bird are of paramount importance in determining its desirability and its economic worth.

Almost every family of birds is helpful to us in some way. Just a very few have been mentioned. In the United States are found more than 800 distinct kinds of birds. In general the smaller land birds are of the greatest value to the farmer.

So with the approach of winter should we not regard the feathered allies as among our greatest friends? Protection should almost be instinctive on the part of the farmer. If in addition to protecting them he will give a little attention to improving nesting sites and scattering grain in winter, he will be repaid amply.

As you hear this subject discussed the ground may be covered with snow and drifts may be piled high by the howling wind. Inside you sit before the fireside comfortable and warm. You do not suffer.

But what about the birds who have sung so sweetly through all the summer months? The birds who have worked for us and given their services without cost? Some have gone South, others stay with us to brighten these drab December days. Have you ever wondered where they sleep on these cold winter nights? They have no warm shelter—save the hollow of an old tree or the shelter of a pine or cedar, the crevice in a clift or eave of a barn. Moreover, they may have gone to bed hungry. Have we thought of these birds as they come around our doorsteps? Are we feeding and protecting them so they will serenade us with their lovely songs next spring?

How much they give us in proportion to what we give them! Let us not forget these feathered friends and remember that Nature's larder cannot always be kept filled. We must substitute for it or add to its food which we have learned birds like. On your farms and yards, help Nature restock her larder for the birds, and plant dogwood, thorn, crab-apple, privet or bayberry. These trees and shrubs bear fruit which ripens in the fall and will not fail to attract winter birds.

The joy in attracting birds to our homes and farms is measured not only by our success in giving shelter and food during the bleak and barren season, but also by the extent to which we gain their confidence and win their companionship. The pleasures one derives from bird feeding are unlimited. To watch their tiny eyes shine as they view the food scattered before them is a real treat! Meeting an old friend and giving him a friendly hand shake could not warm more than to have a tiny titmouse or chickadee light on your hand and fasten his tiny claws around your finger—it is a real hand shake, indeed!

It is a small task, putting up suet baskets, scattering sunflower seeds, apples, old raisins, cracked corn and crumbs in return for all the benefits the birds give us. May we leave with you this bit of poetry by Lolia Mitchell Thornton.

"I am not poor—my garden has more gold
Than all the banks of all the world can hold;
I am not friendless—visitors each day
Eat of my food, and singing fly away."

BANDING OF BIRDS

James Boswell Young
Kentucky Ornithological Society

The history of bird banding reaches back into antiquity, and there are isolated reports of the banding of birds, in ancient times before Christ. However, in so far as America is concerned it is both fitting and proper that the first man to do this work in this country should be John James Audubon, and those of you who have read the story of his life know that in Pennsylvania he banded a brood of phoebes with silver wire and that he was rewarded for his efforts by the return the next season of two of his banded birds.

In December, 1909, there was formed in this country an organization known as the American Bird Banding Association, and this organization, developing a method of systematic trapping of birds, demonstrated fully the possibility of extensive banding operations. Realizing that the information obtained from the work would be of unquestionable value in the administration of the Migratory Bird Treaty Act of July, 1918, the U. S. Biological Survey took over the work of the American Bird Banding Association.

Today there are over 2300 voluntary cooperators working under the supervision of the Biological Survey, gratis, and who up to the present time have banded over 3,300,000 birds. These operators are scattered throughout the United States and Canada, and it has been my pleasure since 1936 to include myself among their number.

Of course, it must be perfectly obvious to all of you that a fundamental effort on the part of every bird bander is to capture, band, and release an uninjured bird. If the bird is injured in any way during the process, the record is of no value because the subsequent history of an injured bird gives us no indication of how a perfectly normal bird would act, and that is what the government really wants to know. Therefore, every precaution is taken to insure the safety of the birds, and in the time in which I have been banding I have yet to experience a serious tragedy of any sort.

The banding itself is done with an aluminum band, the size of which depends on the size of the bird; on each band is a number which is different from any other of any other band. On the band is also printed, "Notify the Biological Survey, Washington, D. C." These bands are furnished free to all cooperators and are placed on the tarsus or leg of the bird taken. At the present time we are instructed to band every species of bird with the exception of the English Sparrow and Pigeons.

There are many methods of trapping birds. At the outset you must accustom the birds to coming to your trapping station by the use of food and shelter. Once you have established such a station there are various sorts of traps used. It is the hope of every bander that he may find one type of trap that will be the perfect trap and take all kinds of birds under all conditions. However, such is not the case, and most operators use a variety of traps.

One of the simplest and incidentally most successful of all traps is known as the Drop Trap, or the Pull String Trap, which is nothing more or less than a wire box, one end of which has been raised and propped by a stick to which is attached a string which is held by the operator who is hidden from view. Food is placed under the trap, and as the birds hop under it to eat, the string is pulled and the trap falls, thus imprisoning them.

Another successful type is called the Sparrow Trap, which is worked on the same principle as a wire rat trap or lobster pot, to wit, an inverted funnel, from which the birds, having entered, find it difficult to extract themselves. One of the most popular types of traps is known as the Potter Trap, named for Miss Jessica A. Potter. This type of trap is merely a small cage with a door that slides up and down precisely like the door of some canary cages. There is a small platform to which is attached an arm. This arm, in turn, holds the door open. When the bird hops upon the platform, the support is removed and the door falls. I say this is one of the most satisfactory traps because once the bird is imprisoned it has no way of escape. This type of trap may be used as a single cell or many cells together.

It has been found from experience that certain birds will enter a trap only from the top. This is particularly true of the Warbler group. Chickadees and Titmice likewise seem to prefer this type of entrance. So there has been developed a type of trap known as the Chardonneret. With this type the door or entrance is on the top of the trap and is held in place by a spring. A small trigger is attached to the end of the door and when the door is opened this trigger is braced by a horizontal rod which serves as a perch and which is hinged. When the bird hops down on the perch its weight pushes the perch downward, thus releasing the spring, and the door springs shut.

Another type of trap involving the same principle is known as the Cohasset Trap, which is nothing more or less than a funnel down which the bird hops into the wire enclosure. When it attempts to get out, it follows the edge of the trap and does not come back to the center and fly upward, which is the only way that it can escape.

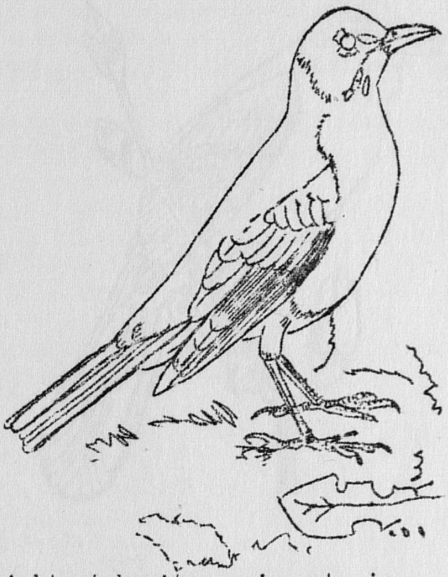
There are many kinds of bait used. In fact, I know of no kind of food ordinarily eaten by birds that cannot be used at some season of the year. In the winter a mixture of hemp seed, cracked corn, millet, and sunflower seed is good. Sunflower seed attracts the Cardinal; the millet attracts Juncos and all the Sparrows. Bread will attract Mocking Birds and in the early spring, Robins. Suet is ideal for Chickadees, Titmice, and Woodpeckers. In the summer time, the finest of all baits for all types of birds is water. A small pool into which there is a slow drip of water is excellent. Robins, Catbirds, Brown Thrashers cannot resist the lure of the shower bath, and as far as I know, water is the only universal means by which Warblers can be attracted. From my personal experience I have taken proportionately more birds from a trap using water as bait than all the rest of my traps put together.

All the methods of trapping which I have heretofore mentioned can be used in connection with water, and it affords a universal appeal to all species of birds.

As to the qualifications of the cooperator himself, it is obvious that he must be sufficiently qualified in ornithology to recognize and distinguish the type of bird he has caught. If he cannot do this his records are worse than useless and lead only to confusion.

Perhaps to those of you who know the birds fairly well this may sound like overemphasis--that identification of a bird in the hand is simple, but there are times when the positive identification of a bird, even in the hand, is a very difficult matter. I refer especially to the Warblers in fall plumage, and I have spent

The first of these is a Robin that I banded one cold snowy 14th of March in 1937 at 11:00 o'clock in the morning. My pull string trap is so situated that it can be operated from my kitchen window, and on that particular day the trap was baited with bread. My good friend, this particular robin, was extremely hungry and he entered the trap without hesitancy. So hungry, in fact, that although the trap had fallen over him, he continued to eat. As soon as he became aware of his imprisonment, I went out, caught him and banded him with number 37-221,802. Apparently the trap did not disturb him very much because at 5:15 the same day I caught him again in the same trap.



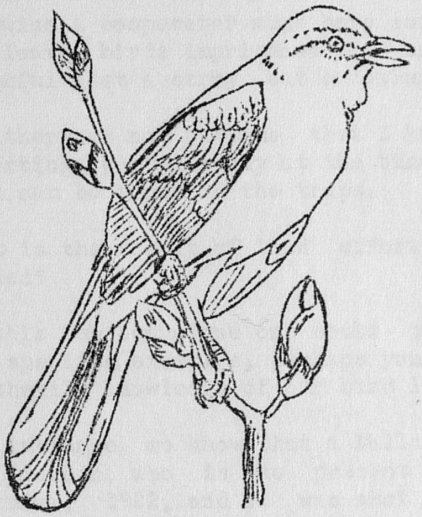
May I say at this point that there are too many records of repeating birds, to allow even a conjecture that trapping frightens birds away. To the contrary, repeating birds are so common in all stations that a phase has been used to describe them. They are known to have acquired the "trap habit," and it is not uncommon to catch a bird fifteen times within the space of 45 days. This type of bird learns that there is plenty of food and no harm in the trap, and he has not the slightest hesitancy in entering. This is particularly true of Titmice and Chickadees, and after a while these birds become more or less a nuisance because they continually trip the trap and occupy it so that unbanded birds cannot enter.

But back to our Robin. That date, March 14, 1937, was the last I saw of this gentleman until the 25th day of February, 1938, one year later when I again caught him. No mistaking it because there was the band on his leg. After a whole winter of vacationing in the south he was nice and plump and fully matured, and my catching him didn't seem to bother him very much. I heard no more of him until St. Patrick's Day, 1939, and there he was in the same trap as fit as ever. You may rest assured that I look forward with considerable pleasure to seeing him again each spring.

I should like also to tell you of a Mocking Bird who has my utmost respect and also the undisputed freedom of my yard. This gentleman was banded by me on New Year's Eve, 1936, at 9:00 o'clock in the morning. His number is 37-210-380. He repeated on the third day of January, 1937, and the tenth day of January.

Perhaps you know that Mocking Birds have a most interesting habit of "defending their territory." This simply means that a certain male Mocking Bird will decide that he is the owner of a certain well defined area, and woe be to any other Mocking Bird that enters. This is particularly true in the spring when he is waiting for a mate, and during that period Robins are the particular source of his displeasure, and he has no hesitancy in chasing them beyond his boundary lines.

This particular gentleman seemed to select my back yard as part of his domain, and trouble waited for any Robin that alighted therein. This was not particularly pleasing to me because it was the time of year that Robins can be trapped rather easily, so I decided to deport my good friend. On the sixth day of February, 1937, I caught him and took him to Hikes Point Lane, about three miles from my home and released him. It is my honest belief that he got home before I did, for there he was ruling the roost as usual. So the next day I caught him again and took him six miles from home and released him. March 5 he was back again. Such persistence should be rewarded, so I did without the Robins and he policed my back yard all that spring. That was the last I heard of this gentleman, and as his most ardent admirer I regretted his disappearance. Much to my surprise and joy on the fifth day of February this year I caught him again and he is now back at the old stand when last I saw him, still giving the Robins the very devil.



There are many interesting problems regarding banding that I hope some day to solve. It has been my pleasure to band a considerable number of Cardinals and I have received many returns from these bands, both at my own station and from persons who have found these banded birds - most of which have met with the tragedy of cats and automobiles. There is a certain winter shifting of Cardinal population, and someday I hope to know more about it. How long do these birds live, how often do they return, and how far do they go on their winter wanderings? Do they keep the same mate year after year? This is some of the many problems.

I believe that the winter home of the Chimney Swift, which still remains a great puzzle to ornothologists, will be found through banding. There are a number of banders who band thousands of Chimney Swifts each year during the fall migration. Some day soon, perhaps sooner than we think, some missionary in the wilds of South America may be handed one of these bands from a native, and then the first definite clue as to the winter quarters of these interesting birds will be known. I am planning to do some Swift banding myself next year, and I hope it will be my band that he finds.

many interesting hours trying positively to identify a Warbler whose back is dull green, whose breast is light yellow, and who has or has not a line over the eye, depending on the way you look at the bird. Is it a Tennessee, a Nashville, or an Orange Crowned Warbler; is it adult or juvenile, male or female?

Likewise a cooperator must have sufficient time to devote to this work. He must not leave birds imprisoned for an undue length of time, and he must always be watchful lest a stray cat or other predatory animal get at the imrpisoned bird.

But there is no pastime that I know of that is more interesting, worthwhile or diverting, particularly at the time of the year when almost any type of migrating bird can be found in the traps.

What is the result of this effort and what worthwhile information has been obtained?

On this subject alone one could talk for hours, but I think that if I give you a few specific examples, perhaps you may be able to judge for yourself whether a worthwhile knowledge of our bird life is being gained.

For instance, we know that a Mallard Duck may live at least fifteen years, for Dr. Lincoln, who is the present head of the Biological Survey, banded one in November, 1922, and it was shot some few miles from where it was banded in November, 1937.

From Banding we have learned that the Marsh Hawk is quite a traveler, for one banded in June, 1937, in Minneapolis was killed near Havana, Cuba, in 1938. There is a record of a Red-tailed Hawk which was banded in June, 1924, at Moose Jaw, Saskatchewan, and killed in Louisiana fourteen years later. An Osprey banded in June, 1936, on Long Island was found dead a year later in Brazil. We know the Chimney Swifts live at least eleven years, for one banded at Thomasville, Georgia, in 1927, was caught in Quebec in 1938. There is a record of a Lesser Yellowlegs banded in Cape Cod on August 28, 1935, which was killed September 3, 1935, in Martiniquo, French West Indies. This distance is more than 1900 miles and indicates a traveling speed of more than 300 miles a day.

Banding has also disclosed a certain East-West or West-East movement of migrating birds which before the era of banding was not suspected. For instance, a Cliff Swallow banded on June 14, 1937, in South Dakota was captured in July of the same year in West Virginia.

Perhaps you may wonder about my own experiences in banding and my own records. I think the greatest reward that comes to a bird bander is the return of birds to his station after the space of a year, or two years, or even five years. Of course, the longer one traps, the more birds he bands, the more returns he is sure to receive. I do not want to bore you with too much data, but I would like to tell you of two interesting birds.

CHIMNEY SWIFT BANDING
Mary Lou and Everett Frei
Glasgow, Ky.

Prof. Anderson . . . . . Bird Bander for U. S. Fish & Wildlife Service

Richard (Dick) Bruce . . . Manufacturer and close friend of Anderson

PROF. ANDERSON: Dick, old man, I want to ask a favor of you.

MR. BRUCE: Anything but my wife, my life, or my money.

ANDERSON: Nothing quite so personal -- just your permission to use that large chimney on the south side of the factory for one of our banding projects. You may have noticed the thousands of migrating chimney swifts that are congregating there. My wife and I have been itching to band them.

BRUCE: Bird banding is your hobby, isn't it? You've my permission, of course, but I'll wager that you'll be itching still worse after you've handled those bedbug carriers.

ANDERSON: But--!

BRUCE: Really, Anderson, why do you waste time banding those dirty chimney sweeps? I can understand why it might not be so bad to have a song bird in the hand (though I would prefer it in the bush) but as for those bat-like creatures! Well, there's no accounting for tastes!

ANDERSON: If you will let me get a word in edgewise, the council for defense will enter his plea for these much maligned birds. You have charged them as being dirty bat-like creatures, and worse of all, bedbug carriers. I'll admit that swifts become somewhat smoky, associating with your chimneys as they do, but chimney swifts--
(cont'd)

ANDERSON: (Cont'd) not sweeps--are birds, and haven't the slightest relationship with bats, which are mammals. Neither may swifts properly be called swallows, but belong to the same order as nighthawks, whip-poor-wills, and (this may surprise you) hummingbirds. So far as carrying bedbugs--that's an old wives' tale. It is true that swifts are host to a harmless insect that closely resembles a bedbug, but which requires a much higher temperature temperature for its survival than that provided by the human skin.

BRUCE: Hmm-m. In that case, the defendant is found not guilty of transporting, toting, or otherwise moving from place to place the socially undesirable bedbug. But, Anderson, you haven't told me yet what chimney sweeps--a-a-swifts are good for, or why the government wants them banded?

ANDERSON: Their food habits are beneficial to agricultural interests. These birds swoop and soar, zig and zag through the air with their unusually large mouths wide open,gulping in flies, gnats, beetles, and ants. They administer to our comfort by helping control mosquitoes. Watch them some summer evening circling over the ponds in company with barn swallows.

The government desires the banding of all useful birds for scientific research. Since the winter home of the swift has never been discovered, the U. S. Fish & Wildlife Service is eager that large numbers of swifts be banded, thereby increasing the possibilities of finding their winter quarters. When it is ascertained to which country they migrate, treaties will be made with that country to assure the swifts of proper protection.

BRUCE: I've heard about peace treaties and trade treaties, but never before about bird treaties. Why do the swifts leave the United States? Does the weather get too cold for them?

ANDERSON: Yes and no. Birds can stand low temperatures provided they can get enough food to keep up their body warmth. The cold weather kills the insects that the swifts use for food, so they go South where insects are still plentiful.

BRUCE: The same general line of reasoning applies to all migrating birds, I suppose. Back to the swifts--how do you plan to trap them for banding?

ANDERSON: Our group, which is composed of several Senior Scouts, (all ardent bird students), my wife and I, will bring the trap, gathering cages, and ladders this evening after the swifts have gone to roost, set up the trap, and come back early tomorrow morning to do the actual banding. Setting up the trap here won't be much of a job, because the chimney is rather low.

The trap we use is the Handley type. A wedge-shaped enclosure which completely covers the chimney opening,and extends about twelve inches beyond one edge. To this projecting portion a metal chute is attached which feeds the gathering cage. The sides of the enclosure are covered with dark cloth, the top with minnow netting, and the large projecting end with transparent celluloid. The birds leaving the chimney, fly toward the light, hit the celluloid window and are deflected through the chute into the gathering cages.

BRUCE: Suppose the birds have been keeping late hours, or have a hangover, and don't want to leave the chimney, what then?

ANDERSON: In that case, we use the equivalent of an alarm clock. An assistant climbs the ladder, and through a flap in the cloth part of the trap, lets down a tin bucket filled with pebbles. This is lowered well below the lowest ring of birds and brought up with a series of jerks. But before we shoo the birds out, we take turns climbing the ladder and peering into the chimney, estimating the number of birds there.

BRUCE: You can really see them, then?

ANDERSON: Yes, indeed, you can feel, hear, and see them. The inside of the chimney appears to be draped with a grap curtain of feathers. The almost imperceptible shifting of so many birds seems to set up a warm current of air. The constant chittering sounds like thousands of baby chicks in a brooder house.

BRUCE: Sounds interesting. Do you have a system of your banding work?

ANDERSON: Yes, we divide the work. Some manage the gathering cages, turn them end to end occasionally, to keep the birds from piling up and smothering. Now and then the chittering of one excited individual will cause them all to flutter in great agitation. Other assistants hand birds from gathering cages to banders, while the most experiences and expert of the group do the actual banding. My wife, in addition to her banding job, keeps a record of bands used, and band numbers of those birds found already wearing aluminum bracelets. We watch for anything unusual--albinos, swifts with exceptionally white throats, and other physical oddities.

(Cont'd)

ANDERSON: (Cont'd) Among the last flock of swifts we banded, we found one with a conspicious tuft of white feathers on its breast. It was quite gentle, as most of them are when in the hand, and after it had been banded, clung sleepily to my wife's sweater, where several of its companions had taken refuge.

BRUCE: You mentioned that Mrs. Anderson keeps a record of birds you find already banded. Have you any way of knowing where these birds came from?

ANDERSON: Yes, we send this report to Washington, and in return,we receive from the Department the name of the bander, date and place of banding. We have retaken swifts banded in Nashville and Clarksville, Tennessee; Ironton,Ohio; Atlanta,Georgia; Blind River, Ontario, Canada; Clemson, S. Carolina; Charlottesville, Virginia; and Concord, Massachusetts. Birds that we've banded here have been recaptured throughout our own county, at Nashville and Clarksville, Tennessee; Winston-Salem, N. Carolina; Joppa, Maryland; Hamden, Connecticut; Ann Arbor, Michigan; Bauxite, Arkansas; Blind River and Boakville, Ontario, Canada; and Roundoak, Georgia.

But of all of our banding work, we are most proud that the bulletin of the Smithsonian Institution on Life Histories of the Chimney Swift, quotes as an outstanding record of cruising speed the fact that "A swift banded at 5:30 a.m. on September 22 at Glasgow, Ky., was taken that same evening in a chimney at Nashville, Tennessee, 90 miles from the point of banding."

BRUCE: There's considerably more to this bird banding than I would have believed. Tell me, do you have any photographs of your traps, cages, operations, and whatnot?

ANDERSON: Only a few pictures of our first small Chimney Swift project, in Sept. 1938. Since then, the number of birds handled each time has so increased, that the actual banding takes all of our time.
You are a camera fiend. Why don't you get up early for once in your life, bring your movie set-up, and meet us here tomorrow morning. You might get some unusual shots.

BRUCE: I'm afraid you just want me to lose my beauty sleep. I'll be there, but if those unusual shots don't show up, I'll probably shoot you instead!

Vision in Birds
By Arch Cole

Light perception organs are the possession of practically all forms of animal life. They vary from the simple pigment spots of the protozoa, through the vesicle structures of the jellyfish and starfish (by which changes in the intensity of light are perceived) to the true image forming eye which is well developed in the higher invertebrates and the vertebrates. The eyes of insects, molluscs, and vertebrates differ markedly in their development and structure. Each type is a complex organ designed to focus rays of light, by means of a lens, upon a retina in which the light sensitive endorgans are located. The vertebrate eye is perhaps the most complicated and the most efficient. It reaches its highest development in the birds, and of these, in the birds of prey.

The hawk or eagle, soaring hundreds of feet above the ground suddenly swoops down and captures a rabbit, ground squirrel, or bird. At a similar distance man would have to use a field glass to distinguish it. Imagine being able to see a mouse running around in the grass even a block away. The swift, traveling at an estimated speed of 30 to 80 miles per hour, suddenly swerves to catch a small gnat, little larger than a pin head. A man standing still would have difficulty seeing it even at close range. Sparrow hawks can see small beetles at 200 feet. The acuity of the birds eye is said to be about one hundred times that of man.

Among the special senses, vision is, without doubt, the most important for birds. Taste is very poorly developed. Birds will without hesitation eat their normal food even after it has been soaked in a bitter extract, such as aloes. Smell is also very rudimentary, being best developed in the lower birds. Apteryx, that primitive, New Zealand, flightless bird is a night feedor. It eats worms and grubs, which it catches by rooting with its long beak in soft soil. Its nostrils are at the end of the beak. Apteryx has the best developed olfactory organs of any of the birds. In most birds the nasal cavity, and the tongue also, is horny and dry and ill suited for the location of chemoreceptors, such as olfactory and taste buds. The vulture, which has the reputation of possessing a keen sense of smell in order to locate its decomposing food, is probably enjoying an unjustified distinction. It has been shown, by scientifically controlled experiment, that vultures do not find very ripe carrion if it is covered so that it cannot be seen. Popular books however, have many stories which do not bear out this contention.

Birds possess a fairly acute sense of hearing. However, the auditory apparatus is not so well developed and is functionally much inferior to that of most mammals.

Many observations and experiments illustrate the importance of vision in the behavior of birds. Birds will respond to their reflection in mirrors, before which they will strut or fight. Male canaries show signs of sexual excitement when shown a toy canary of pasteboard. Vultures tore up a canvas painting of a dead sheep but did not disturb a real dead one which had a piece of canvas thrown over it. Lashley showed that terns and other birds that nest in colonies found their own nests on the basis of visual cues such as a stone, a stick or a clump of grass. If these cues were removed the bird was lost, and unlike Dr. Boone who never was lost but was once a little perplexed for three days, they gave every indication of realizing the fact.

Vision is important in the determination of normal posture and balance. If blindfolded a bird's head sinks until it touches the ground. Sometimes the bird even lies down on its side.

In most, if not all birds, vision is the chief modality in feeding. Hens and pigeons starve to death in the dark while surrounded by an abundance of food.

Birds are capable to responding to slight variations in intensity of light. Lashley reported that bantam cocks discriminated accurately with differences in intensity of 1.8 and 18.0 candle-meters. The threshold he believed to be about 1 to 3 (6 and 18 candle-meters). The threshold in chicks and pigeons is about the same as that in man. Experimentally both birds stopped feeding when the light intensity was decreased to the point where an observer no longer could distinguish the individual grains of food. As the intensity was increased both the pigeon and the chickens began to feed again at the same time the observer could again distinguish grain. If both observer and the birds were dark adapted (kept in a dark room for sometime) the observer saw the kernels and the birds began feeding at a much lower light intensity than before.

Experimentally, chickens distinguish between triangles and circles. If the chicks were offered corn cut in the two shapes but with the circles glued down, the birds soon became conditioned to the extent that they only ate the triangles even though the circles were free. Crows can distinguish circles, triangles, squares, and hexagons.

In size discrimination, chickens distinguish between circles 5 cm. and 8 cm. in diameter. Crows are much more sensitive in this respect. They have greater visual acuity and can distinguish a 5 cm. circle from one 4.5 cm. in diameter.

Birds stand high in the ability to distinguish moving objects. Normal prey put in large cages with a protective color background, with such birds as hawks, owls, chickens, crows, and kingbirds, was taken much more often if the prey moved than if it remained motionless. Birds of prey took their food almost always when it moved. This does not mean however, that they did not see it when it was quiet. It may mean that such birds preferred animals that were clearly alive. One may often observe a hen chase a flying grasshopper and then fail to find it when it remains motionless.

These experimental and observational results clearly indicate the importance of vision in the behavior of birds. Its importance is also indicated by the large size of the bony orbit of the birds skull, and by the relatively large size of the eyeball.

In birds the bony orbits occupy about one third of the whole head, one half in the case of the woodcock. The size of the orbits restricts the brain to the posterior part of the head. The orbits are separated by a thin interorbital septum, which greatly reduces the nasal cavities.

The eyeball itself is extremely large, being in the swallows about five percent of the total weight. The eyeball of the ostrich is as large as that of a horse, the two being the largest eyes among terrestrial animals. The eye of the sparrow is nearly one third the diameter of that of man, although a man is twelve hundred times as large. The large size of the eye of birds is correlated with a relatively greater development of those parts of the brain that control light perception.

large eyes furnish large,well-developed images and are found in animals that move the head or eyes rapidly and that require instantaneous vision. Birds certainly fall in this grouping. Unlike man, the eyes of birds (except owls) are placed laterally in the head. The axes of the eyes are not parallel, and there is little overlapping of the visual fields. They possess, for the most part, monocular vision or, at the best, incomplete binocular vision. In man where both eyes look forward, light from one object is registered in homologous parts of both eyes. The optic fibers from the corresponding parts of both eyes go to the same side of the brain, being crossed from one side and uncrossed from the other. The images from the two eyes are thus superimposed in the brain, giving stereoscopic vision, with depth of field and clear form and size perception. In birds the axes of the laterally placed eyes are not parallel; there is very little binocular vision, no superimposing of images, and practically no uncrossed optic fibers. What the average bird lacks in depth of field he gains in range of vision. This is the usual condition in animals with a poor defense. We can see but little except that which is before us. The bird sees in front, at the side, above, and much that is behind it. The bird really sees two fields at once, one with each eye. When necessary it can suppress one field and concentrate on the other; witness the old hen cocking her head to view upward for an approaching hawk. We do the same thing when we look through a microscope or sight a gun,with both eyes open. We suppress the image formed by one eye and focus our attention on the other.

Animals with monocular vision depend greatly on movement. We do also in our monocular retinal fields, that is,at the periphery of our field of vision, or those parts of our visual field which are not common to both eyes. If one holds his hands out laterally at the level of the eyes so that each hand is out of the binocular field, but still in the monocular field of each eye, the fingers are seen indistinctly, but movement of the fingers can be clearly detected. Birds increase their perception of stationary objects by moving their heads and bodies, thus bringing in the light from such objects from many angles and focusing the rays on the macular areas of clearest vision. You have all noticed this behavior in the brown creeper as it moves over a tree trunk in search of hibernating insects, eggs, or cocoons. The long, moveable neck and the single occipital condyle (the universal joint where the skull meets the vertebral column) gives to birds great freedom of movement of the head. Birds with binocular vision are not so dependent on head movements. In the early evening you have often noticed the owl sitting quietly watching the ground for the movements of a meadow mouse.

Birds have true eyelids as do mammals. They are moveable but rarely close except when the bird is sleeping. The edges are fleshy and irregular and even when closed they do not meet at all points. The lids of many birds are provided with rudimentary feathers which act as eyelashes. The third eyelid, or nictitating membrane, so rudimentary in man, is well developed. Attached to the medial angle of the eye, it can be drawn across the surface of the eyeball, toward the lateral side, to cover the whole anterior surface. It is the lid of most frequent usage, serving as a protection against foreign particles,against air pressure in flight, against water in diving, against sunlight (owls in the daytime keep their third eyelid closed), and serves as a sweep to clear away materials which have settled on the cornea. The front of the eyeball is lubricated by secretions from the lachrymal gland and from Harder's gland, but the secretion is scanty and its flow is not the same as in man, so the nictitating membrane serves as a mop to spread the lachrymal fluid over the cornea. The pyramidalis muscle, which controls the

third eyelid is very interesting in its action. It is a small, skeletal muscle under voluntary control and is located on the back of the eyeball. Its very long, slender tendon passes through a fibrous pulley and then winds around the lower border of the eyeball and is attached to the lateral edge of the nictitating membrane. The lateral pull which it exerts on the membrane is thus in quite a different plane than that in which the muscle lies.

The extrinsic muscles of the bird's eye are about the same as those in men. Six small muscles extend from the bony orbit to the eyeball in such a way that the eye may be rotated in its socket. In binocular vision the two eyeballs are rotated synchronously, but this does not necessarily occur in birds with monocular vision.

The structure of the bird's eyeball is in general the same as that of man, but it differs in essential details. Both are very complicated for each is a delicately controlled mechanism, capable of rapidly shifting from a sharp focus of parallel rays of light from far objects to a sharp focus of divergent rays from close objects. This shift is called accomodation to distance and is accomplished by the action of certain muscles within the eyeball itself. The muscles are used to focus on close objects. We are conscious of this muscle action when our eyes become fatigued after prolonged near vision. In the human eye, accomodation is produced by the contraction of the ciliary muscle which allows the lens to become more spherical. The greater convexity of the lens bends the diverging light rays from a near object and brings them to a focus on the retina. Parallel rays from a distant object need not be bent so much if they are to be focused on the retina, so the muscle relaxes, and the lens becomes more flattened or less convex. Accommodation of this sort is similar to changing the lens on a camera when one uses a more convex lens for near objects and a less convex lens for a distant landscape.

Birds have this same type of accomodation mechanism but in addition they possess a circular striated muscle which encircles the eyeball. When this muscle contracts the eyeball is elongated and made tubular. The distance between the retina and the lens is increased. This is similar to drawing out the bellows in a camera, in taking a close-up. By this double mechanism the bird can really change its eye from a telescope into a microscope. The presence of the faster acting striated muscle in the bird's eye provides for accomodation which is much more rapid than that of man.

The outer, fibrous covering or tunic of the eyeball is, as in the human eye, divided into the transparent cornea which covers the anterior region, and the heavier sclera which covers the retinal and intermediate areas. The highly spherical cornea of birds act as an efficient lens and helps to gather and focus light rays on the retina. Furthermore it is capable of changing its shape and so serves as an additional lens mechanism in accomodation of the eye to distance. The sclera in the human eye is tough and fibrous and serves to maintain the shape of the eye and to protect the inner structures. In birds, however, this function is augmented by the presence of a cartilaginous cup in the retinal hemisphere and by a series of overlapping bony plates in the intermediate region. These cartilaginous and bony structures prevent too great a misshapement of the eye during contraction of the powerful intrinsic musculature.

The vascular tunic, which lies just within the sclera, is composed of the iris in the anterior hemisphere and the choroid coat in the retinal and the intermediate portions, the two being connected by a complex structure the ciliary body. The iris does not slavishly follow the cornea but is a flat curtain suspended across

the front of the eyeball,perforated by an opening, the pupil, through which light rays must pass. The space between the cornea and the iris is the anterior chamber and is filled with a viscous fluid known as the aqueous humor. The iris is highly colored in day birds but is black in most nocturnal birds. It is provided by both circular and radial muscles, which can, by their contraction,increase or diminish the size of the pupil and thus regulate the amount of light entering the eye (accomodation to light.) These muscles which are involuntary in man, are under at least a partial voluntary control in birds, for the size of the pupil of the parrot and owl may be seen to change without reference to distance or light intensity. The pupil of most birds is circular regardless of its size. In nocturnal birds however, it is slit shaped when constricted. Posteriorly the choroid layer lines the sclera and is very vascular. It lacks the dense pigmented layer, the tapetum, which reflects light in the mammalian eye and which causes the cats eyes to shine.

Just behind the iris is the lens, a biconvex, transparent disc. It is attached at its periphery to the suspensory ligament which,when the eye is at rest, exerts a radial pull on the lens and maintains it in a flattened shape. The structure of the lens is such that its shape can be modified; thus when the pull of the suspensory ligament is released it becomes more convex, due to its own inherent elasticity. The lens of the bird's eye is relatively large. It is very convex in nocturnal birds (for near vision), more flattened in day birds. In birds of prey,where rapid accomodation is necessary, radial fibers in the lens favor rapid changes in its shape.

The inner layer of the retinal hemisphere is lined with the retina. In it are the rods and cones which are the light sensory end-organs. In contrast with the mammals, there is a predominance of cones, especially in day birds. These retinal elements are finer and more numerous than in mammals which probably accounts for their acuity of vision. Hess extimated that the number of cones in the retinal of an owl reached $2\frac{1}{2}$ millions. At the point of emergence of the optic nerve is the blind spot, a portion of the retina which contains neither rods or cones. A well defined macular region with a large fovea is always present, and in some birds two or even three macular areas are found. The foveae of these areas contain only cones and are regions of clearest vision. Double maculae are thought by some to produce a stereoscopic effect in a monocular eye. Within the retina are found numerous yellow and red oil droplets which are characteristic only of birds.

Another structure peculiar to birds and a few reptiles is the pecten,a pigmented, irregular body which extends forward into the posterior chamber between the retina and the lens. It is attached to the optic disc but is otherwise free. It is highly vascular and thus erectile. Its shape and color is characteristic for each species. Hanging free in the posterior chamber between the lens and the retina it causes a large blind spot. This may account in part for the rapid movements of the head in certain birds. The function of the pecten has been long in question. To it has been ascribed the function of a light filter (nocturnal birds have a small pecten); that it is a hydrostatic organ which compensated for changes in volume of the posterior chamber during accomodation; that it helps to push the lens forward during accommodation; that it is the source of the vitreous humor, the viscous fluid which fills the posterior chamber; that it is the vascular supply of the retina. Most investigators favor some vascular function.

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In the human eye the main muscle of accomodation is the ciliary muscle, and involuntary sheet which connects the anterior part of the sclera to the suspensory ligament of the lens. Contraction of this muscle relieves the tension which the ligament exerts on the lens, thus allowing the lens to assume a more spherical shape. The more spherical lens bends the light waves at a greater angle and so focuses them on the retina. Accomodation for distance is thus accomplished by changing the shape of the lens. It is less spherical for parallel rays of light coming from distant objects, more spherical for the divergent rays coming into the eye from near objects. The eye is resting when focused on distant objects.

In birds the muscles of accomodation for distance are more complex. Instead of one muscle, there are three. Brucke's muscle is similar to the ciliary muscle; it decreases the tension of the suspensory muscle and thus allows the lens to become more spherical. Crampton's muscle is a heavy circular band which encircles the intermediate region of the eyeball. Contraction of Crampton's muscle constricts this part of the eye, pushes the lens and the corneal region forward, making the cornea more conical in shape, and pushes the retinal hemisphere backward. It thus changes the whole shape of the eye, making it more tubular. Furthermore this muscle is striated and so its action is very rapid. The bony plates in the intermediate region protect the eye from gross misshapement during the contraction of this powerful muscle. Mueller's muscle is similar to Crampton's but is attached to the iris as well and helps to integrate accomodation to light with accomodation to distance.

Most wild birds have a hypermetropic (far-sighted) eye. Domestication tends to make the eye somewhat myopic and astigmatic. This has been repeatedly observed during examination of the eyes of wild birds that have been confined to zoos.

At rest the birds eye is less tubular, that is, the anteroposterior diameter is relatively short, the suspensory ligaments are tense, the lens flattened, the cornea rounded, and the ciliary muscles in a state of relaxation. The eye is adjusted for far vision.

The mechanics of accomodation to near vision involves the following changes. The contraction of Brucke's muscle releases the tension on the suspensory ligament, the lens becomes more convex. Contraction of Crampton's and Mueller's muscles constricts the intermediate region, the cornea becomes conical, the lens is pushed forward, the eye becomes more tubular (anteroposterior diameter of the posterior chamber is increased) the retina is pushed further away from the lens. The eye has been changed from a telescope to a microscope. It is adjusted for near vision. These changes take place very rapidly.

When the muscles relax the eye goes back to the resting state due to the elasticity of the sclerotic plates and the elastic tissue of the whole eyeball.

The major differences between accomodation to distance in the bird's eye and in the human eye are then: (1) increase in the distance between the retina and the lens; (2) increase in convexity of the cornea; and (3) rapidity of accomodation due to the presence of skeletal muscle. The eye is very similar to a camera. With a camera one can focus on near objects either by using a more spherical lens or by increasing the distance between lens and film. Birds can do both; man can only change the shape of one lens.

Nocturnal birds have dark adapted eyes. The rods and cones of the retina have a layer of pigment about them so arranged that all of the light entering the eye is utilized. The eyes of such birds are large, more tubular than day birds, the cornea is more conical and the pupil is capable of great dilation to admit all the light possible. Such eyes are adapted for near vision. Contrary to the usual conception, owls can see very well in the daytime, but they can see better at dusk and of course not at all in complete darkness. The fallacy about owls not being able to see in the daytime is due of course to the usual observation these birds are not often seen in bright sunlight. This is probably due to the fact that they are resting from their nocturnal labors and are hiding from the attacks of day birds which apparently take great delight in worrying them.

The fact that most birds are colored, many of them brilliantly, indicates an appreciation of color. Color vision is supposedly resident in the cones. Night birds have fewer cones; they are preponderant in day birds, in fact the number of rods is greatly reduced in some birds.

If in an otherwise darkened room, a strong light be passed through a prism and the resulting spectrum focused on the floor over which grain has been scattered, a hungry hen will eat the grain from the red, orange, yellow, and green areas, but fails to see the grain illuminated by the blue light. She behaves as if the blue-violet end of the spectrum were black. Apparently she does not perceive blue light. This is true of all birds so tested. If one puts on glasses with one yellow lens and one red lens then one does not see the blue end of the spectrum either. The red and yellow oil droplets which were previously described in the bird's retina apparently act as a screen, shutting out the blue-violet rays. If this is true then the various theories of color selection in birds is partially wrong, for the development of blue and indigo plumage, which appears black to birds, is then incidental and without reason.

Although the keenest vision, the widest range of accomodation, and the most complex mechanism for rapid accomodation is found among birds, not all birds have the same degree of development of the eye. There is a wide range of variation between the near sighted eye of the ground bird, the far sighted eye of the eagle, and the binocular eye of the owl.

CUCKOO TIME ON THE AIR
By Kent Preievette

OPENING: (The sound of the cuckoo clock, or instrumental imitation) Cuckoo, cuckoo, cuckoo, cuckoo, cuckoo, cuckoo. (Soft background of music joins in the sound of the cuckoo and continues as the announcer speaks).

ANNOUNCER: (With dulcet and vibrant tones) It's cuckoo time, folks. It's cuckoo time on the air, when those genial birdfellows from way back yonder--Uncle Billy and his band--serenade you with tweets and chirps and squaks--with chatter and melody,with philosophy and fun--all to remind you the turkey's still in the straw. Let her go, boys. Shake the birdseed out of your hair. (The music wells forth in a spirited rendition of "Turkey in the Straw.")

UNCLE BILLY: (To announcer) Well, Larry, how was that? Scatter enough to suit you?

ANNOUNCER: Sure did, Uncle Billy. You'n Fiddlin' Sam and Sarah Jane, there, scattered enough to feed all the birds in the neighborhood.

UNCLE BILLY: Well, Larry, we're just in a scattering mood, and that's what everybody ought to be. Here it is six o'clock in the morning and it ain't good daylight, and look at them redbirds out there.

FIDDLIN' SAM: The early bird shore catches the worm.

UNCLE BILLY: (With disgust) The worm! Why, whats the matter with you, man? That ground's so frozen there ain't a worm between here and China.

SARAH JANE: Redbird don't want no worm. They like sunflower seeds.

ANNOUNCER: They sure do, Sarah Jane. And Cantaloupe seeds, too. Everybody ought to save the cantaloupe seeds just for the redbirds.

UNCLE BILLY: I think the Kentucky Cardinal is the prettiest bird we got, and it's got some high and mighty ways. He won't eat with common folks.

SARAH JANE: Won't eat with his wife, either.

UNCLE BILLY: Well, that's right. What's a wife for but to wait on the table.

SARAH JANE: (Midst general laughter) I like that!

ANNOUNCER: Say, there's a woodpecker.

SARAH JANE: Oh, the darlin'. What kind is it?

ANNOUNCER: Dryobates pubescens medianus.

MEDLEY OF VOICES: (Mingled Astonishment, mock disgust, riducule) What! Hey there, don't get highbrow on us. We ain't ornithologists. Lord have mercy.

UNCLE BILLY: Listen here, Larry. There's one thing I can't stand. One of these fellows spoutin' high soundin' names. That there's a downy woodpecker, and you know dern good an' well it is.

ANNOUNCER: O. K., Uncle Billy. I won't--

FIDDLIN' SAM: I'd shore hate to be one of them ornithologists. If I had to be a nut, I'd shore want to grow on a different kind of tree.

UNCLE BILLY: Speaking of nuts--and I'd be the first to deny Sam any rights on the subject of nuts. But speaking of nuts, can you tell me why the woodpecker is the most superstitious of all birds?

ANNOUNCER: Why, no, Uncle Billy. Why are they?

UNCLE BILLY: Why, cause he's always knockin' on wood.

SOUND EFFECT: Plunk, plunk.

FIDDLIN' SAM: (Midst laughter) Hey, that's my head! (The laughter blends into another number, preferably a hillbilly piece about birds.)

ANNOUNCER: That's fine Uncle Billy. I could see the feathers flying in the air, the way Sarah Jane was plucking that guitar.

SARAH JANE: Say, Larry. I've got a question, too. How would a mourning dove go if it went on a drunk?

ANNOUNCER: Why, that's easy, Sarah Jane. It'd go "cuckoo." (He gives it a hiccup inflection.)

UNCLE BILLY: (Midst laughter) You don't have to study ornithology to know that. How would a woman go if a man went on a bat?

ANNOUNCER: How would she go, Uncle Billy?

SARAH JANE: Bet I know. She'd go on a lark.

ANNOUNCER: (Midst a chorus of "That's right") Well lark rhymes with dark. See, it's good daylight. Look at all those birds out there. Juncos, titmice, chickadees.

SARAH JANE: Oh, look at the Carolina Wren.

FIDDLIN' SAM: That bird shore can make a fuss f'r a little bird.

ANNOUNCER: They all like that suet, too. Suet is the ambrosia for birds.

SARAH JANE: What 'bout a little nectar, Larry?

ANNOUNCER: Water's their nectar. When the streams are frozen over we ought to break the ice. A pan of warm water on the window ledge in winter helps, too.

UNCLE BILLY: Larry,have you noticed how many different birds been eatin' suet out of them cocoanuts I hunt up out there--just in the little time we been talkin' here.

ANNOUNCER: Yes, I have, Uncle Billy. Tell me, how did you fix them?

UNCLE BILLY: I rendered the suet just like you would lard and mixed it with bread crumbs. Or, you can grind up the cocoanut meat if you ain't too lazy to hull it out.

SARAH JANE: Oh, there's another woodpecker. Now, Mr. Ornithologist, without quoting any Latin, tell me what kind is that.

ANNOUNCER: That's Mr. Hairy Peck, three inches longer than his cousin Downy. He can hang on the side of a cocoanut as easy as you please.

FIDDLIN' SAM: Say.

ANNOUNCER: Say what, Sam?

FIDDLIN' SAM: What would happen if an ostrich sat on a nest full of cocoanuts?

SARAH JANE: Nest full of cocoanuts! Who ever heard of such a thing?

ANNOUNCER: She'd get chronic incubation if she sat long enough. (There is general laughter).

FIDDLIN' SAM: (Doggedly) That ain't the answer.

ANNOUNCER: Oh, there is really an answer. (Repeats meditatively). What would happen if an ostrich sat on a nest full of cocoanuts? I don't know what would happen?

FIDDLIN' SAM: Nuthatch.

EVERYBODY: (Midst laughter) Cuckoo!

UNCLE BILLY: Take a look at that mocking bird out there.

FIDDLIN' SAM: (With admirmation) That's a bird.

SARAH JANE: Oh oh. That means Sam's going to play his favorite piece.

UNCLE BILLY: Couldn't pick a better one, could he, Larry?

ANNOUNCER: I'll say he couldn't.

SARAH JANE: Better purse your strings, Sam, 'fore you whistle that fiddle.

UNCLE BILLY: (As Sam tunes fiddle) Ain't that like a woman. Always worrying a man 'bout his pocketbook. Yes, sir, one time Sam played that piece out in the orchard and ten mocking birds came a dartin'. They all thought he was another mocking bird what had got in their territory, trying to court their hens. When they seen it was Sam and his fiddle they all decided to take lessons. Everyday for a week they sang with his fiddle until they got so perfect you couldn't tell them apart, much less tell them from the fiddle. That lasted a whole week until some--(His voice trails off).

CHORUS OF VOICES: What happened?

UNCLE BILLY: Oh, some dern ornithologist came along on some bird census. You know, they're always prin' into the private lives of birds as well as people. (There is laughter). Ready, Sam. That's the greatest fiddlin' piece in all the world.

SONG: (As the tune nears the end Uncle Billy resumes, his voice a sort of obbligato to the Mocking Bird as played by Fiddlin' Sam). Yes, sir, that's the greatest fiddlin' piece in all the world. . . I can see him dartin' up and down at the tree top. . . with the flash of white on his wing . . . The cat bird and the thrasher . . . they don't stay with us in winter . . . but the mocking bird, he stays all the year round . . . When the snow 'son the ground, and there's ice and sleet . . . he stays just the same . . . If you don't feed him now you may not hear his pretty song in spring. (The piece ends). Yes, sir, Larry, the birds were the first music makers on this earth--and the finest, too--unless it be this here band.

CHORUS: Cuckoo, Cuckoo.

ANNOUNCER: We leave you now, folks, with a chirp in the heart and a song on the wing. (They resume playing the opening theme and continue faintly.) So remember the birds when remembering friends. They will entertain for their dinner, and their dinner costs so little. Scraps from the kitchen will bring beauty and melody to your door.

CUCKOO CLUB
By Kent Previette

ANNOUNCER: (With enthusiasm) It's cuckoo time, ladies and gentlemen, it's cuckoo time on the air!

CLOCK: (Coincidental with announcers, gradually fading) Cuckoo, cuckoo, cuckoo, (etc.)

ANOTHER ANNOUNCER (LARRY): The Blue Bird Housing Administration presents!

ANNOUNCER: (As the clock ceases) The Cuckoo Club of the air.

LARRY: Here they are, folks. Those genial birdfellows from way back yonder. Uncle Billy--

UNCLY BILLY: Here.

LARRY: Sycamore Johnson.

SYCAMORE: (Speaking with a drawl) Here-uh.

LARRY: Johnny.

JOHNNY: Present.

LARRY: And a new member, sitting right over there.

UNCLE BILLY: That's Mr. James, Larry. He's a drummer out of Louisville.

LARRY: Well, Mr. James, we're glad to have you here at our informal meeting around the warm stove in Uncle Billy's store. Some of our members are missing, Uncle Billy. Where's that good looking daughter of yours?

UNCLE BILLY: Sarah Jane? Oh, she's out somewhere with that new school teacher.

SYCAMORE: That there lady ornithologist?

UNCLE BILLY: Yeah. Wasn't much tradin' and she wanted to help put up some of them bird boxes.

SYCAMORE: Was Sarah Jane wearin' pants, too? (There is general laughter)

LARRY: Say, Sycamore, looks like you've been studying ornithologists.

JANES: First thing you know, he'll be putting up bird boxes.

SYCAMORE: Heck, that's what I been doing all morning--that and answering questions.

LARRY: What kind of questions?

CLOCK: Cuckoo!

SYCAMORE: That's the time, Johnny.

LARRY: (Midst general laughter) Say, Johnny, where'd you get that clock?

JOHNNY: Pap gave it to me.

UNCLE BILLY: That's one I bought at the Squire Mitchell sale.

LARRY: Will it run?

JOHNNY: Don't know. That's what I'm trying do, make it run. If I can't make it run I'm goin' to give it to Miss Winton for a bird box.

CLOCK: Cuckoo. (There is the usual laughter.)

JAMES: Don't mean anything personal, do you?

JOHNNY: (Not comprehending) What's that? (All laugh except Johnny).

SYCAMORE: That there's the kind of question she was askin', all right.

LARRY: Why, Sycamore! What makes you say that?

SYCAMORE: You ought t' 've heard her. One thing, she wanted to know whether it was more 'n ten feet from the ground to the highest she could reach with a hammer when she was a standin' in my hands.

LARRY: Standing in your hands!

JOHNNY: Yeah, and you ought t' 've seen her grabbin' for his head when she lost her balance.

JAMES: How often did she lose her balance?

JOHNNY: (Elaboratingly) Oh, every time they put up a bird box. (All laugh.)

LARRY: Sycamore, why aren't you helping her now instead of Sarah Jane?

JOHNNY: I'll tell you--he was always making her lose her balance.

UNCLE BILLY: I think Sycamore's tryin' to figger out a way to help her when Johnny's not around. (More laughter.)

LARRY: Sycamore, why was she so concerned about the distance from the ground?

SYCAMORE: She said you wasn't supposed to put a bluebird box more than ten feet from the ground.

JAMES: Why's that?

SYCAMORE: It ain't their habit to nest any higher, so she said.

LARRY: She's right about that. Bluebird boxes should be from five to ten feet from the ground.

UNCLE BILLY: What was the idea of her standing in your hand, then? Either one of you could reach righer 'n five feet.

JOHNNY: That's so people won't bother them.

JAMES: Bother who?

JOHNNY: (Impatiently) The bluebirds. (The others laugh.)

CLOCK: Cuckoo.

LARRY: Well, Sycamore, did you figure out how high the boxes were?

SYCAMORE: She's goin' to take a yard stick out and measure it.

JAMES: Will she need you to hold her up for that?

SYCAMORE: Naw. (Pause midst laughter) Then she wanted to know if I thought the hole was big enough for them to get in, and was it little enough to keep other birds out.

UNCLE BILLY: What did you tell her?

SYCAMORE: Why, I said it looked all right to me.

LARRY: You know what the diameter of the entrance should be, don't you, Sycamore?

SYCAMORE: She said it ought to be an inch and a half.

LARRY: That's right.

JAMES: There's a whole lot in that. One of my friends out in Audubon Park there in Louisville had a bird box his boy made at school. He put it up one day and a bluebird tried to get in and couldn't.

JOHNNY: Why didn't he make it larger?

HARRIS: He did. Took it down and whittled the hole some and put it back up. The bluebird had been settin' on the telephone wire all the time watching him. The minute he went away the bluebird tried to get in again.

LARRY: You don't say!

UNCLE BILLY: What happened then?

JAMES: Why, it was still too small. So my friend took the box down and whittled the hole bigger. The bird was setting on the line just like he was before, waiting for him to finish.

SYCAMORE: What did the bluebird do then?

JAMES: Why, he went right in and started building a nest.

MEDLEY OF VOICES: Well, I swan! ... Can you beat that! ... That was some bird.

CLOCK: Cuckoo. (All laugh.)

JAMES: Say, Johnny, you'd better get that clock under control. Wasn't nothing cuckoo about that.

LARRY: I believe Johnny has that clock under perfect control. Mr. James, that was one tall tale, all right.

JAMES: That's the truth. Wasn't no joke about that.

LARRY: That really happened?

JAMES: Yes, sir. I'll give you his name and address and let you write him, if you don't believe it. He works at the Post Office.

LARRY: Well, well, that just goes to show how hard pressed the bluebirds are to find nesting sites.

SYCAMORE: Why don't they build in a tree just like any other bird?

UNCLE BILLY: That ain't their nature.

JOHNNY: They build nests in a woodpecker's hole.

LARRY: Yes, Johnny's right. They build in cavities in trees. Sometimes natural cavities, sometimes those abandoned by woodpeckers. You know, there aren't many cavities for them to build in like it used to be. We've cut out the forests, and burned the dead wood until there's not much left.

JOHNNY: I seen a titmouse with a nest in a fence post at the graveyard, once.

SYCAMORE: She said titmice would build in bluebird boxes.

UNCLE BILLY: Well, I had a jennie wren to try and build a nest in my coat pocket out in the woodshed, once.

JAMES: Wrens 'll build anywhere. I know a guy up in Louisville that makes bird boxes out of anything he gets his hands on. Old shoes, straw hats, lard bucket, glass jars.

CLOCK: Cuckoo.

JOHNNY: They ain't no good.

SYCAMORE: Why ain't they? Why, a jenny wren 'll build in anything, won't they, Larry?

UNCLE BILLY: Jenny won't but her husband will. He's always buildin' nests and tryin' to get her to set in them. If she don't like it she'll build one of her own.

LARRY: I've seen that happen. Speaking of freak houses, lot of people have the idea that birds will build in fancy affairs. They'll paint them several colors and put them in places where cavity nesting birds don't go.

UNCLE BILLY: They want simple protection--something natural like.

LARRY: That's right. Also in the kind of place they're used to.

SYCAMORE: Well, why does a wren want a door step and a bluebird don't?

JOHNNY: You mean a perch.

CLOCK: Cuckoo.

SYCAMORE: I wished I'd had that clock this morning. I'd 've made it go off every time that woman opened her mouth. She said doorstep.

LARRY: She was just being whimsical.

JAMES: I can see right now Sycamore don't appreciate whimsical, lady ornithologists.

LARRY: That's kind a sad, isn't it. Here, Sycamore has a chance to study ornithology at the feed of an expert.

JAMES: (Laughingly) Feet is right.

JOHNNY: What does whimsical mean?

LARRY: 'Fraid you got me there, Johnny. I'd say, sort of cute, wouldn't you, Sycamore?

JAMES: Yeah, Sycamore ought to know. Was she cute?

SYCAMORE: Huh? (Apprehensively) What y'u say?

JOHNNY: (Loudly, as Sarah Jane calls from front of store) He said was she cute?

SARAH JANE: Sycamore back there?

UNCLE BILLY: Yep, he's here.

LARRY: Hello, there, Sarah Jane. You're late to our club meeting.

SARAH JANE: (Voice nearer) Oh, am I? I made up for it--brought a new member.

LARRY: That's fine. Come right back and join us. Sycamore, here, was leading the discussion on Bluebird houses.

SARAH JANE: (Surprised and a bit skeptical) Oh--he was?

CLOCK: Cuckoo.

MISS WINTON: (Slightly shrill) What's that?

LARRY: That's an inanimate but articulate member of the family Cuculidae.

MISS WINTON: What? What'd you say?

SARAH JANE: Aw, that's that old cuckoo clock Johnny's a foolin' with. Larry's just airing his Latin.

MISS WINTON: But that is the family name for the cuckoo. How'd you happen to know that?

LARRY: Just an accident. Have a seat and we'll talk some more about bluebird houses. Do you know everybody. This is Mr. James. I guess you know all the rest. (Murmured greetings are exchanged)

JOHNNY: Miss Winton, what does whimsical mean?

LARRY: Never mind, Johnny. Let's finish our discussion on bluebird houses.

JOHNNY: That's what we were discussing.

UNCLE BILLY: That'll do, Johnny.

SARAH JANE: Look it up in the dictionary.

MISS WINTON: Maybe it means full of whims.

UNCLE BILLY: Like a jenny wren. I was just telling them about a wren trying to build in my coat pocket, once.

SYCAMORE: Bluebirds ain't that crazy, are they?

MISS WINTON: Crazy! Why do you say they're crazy?

SYCAMORE: Cause they don't build in trees like all other birds.

MISS WINTON: But all other birds don't.

LARRY: They're kind a like people, aren't they? Some live in high places, some in low. Some build in trees and other build on water. Some burrow in the ground, even.

UNCLE BILLY: There are cave dwellers, too.

SYCAMORE: Ain't nobody that lives in a chimney, I know of. What'd the swifts do before there was any chimneys?

MISS WINTON: You know what Audubon said about chimney swifts, don't you?

SYCAMORE: No, ma'am.

MISS WINTON: He said they liked hollow sycamore better than anything. (There is much merriment.) So you'd better not tell them your name.

LARRY: Say, Johnny, what's the matter with the sound effects? Where is Johnny?

UNCLE BILLY: I saw him sneaking out awhile ago. Here's the clock, right over here.

MISS WINTON: What makes it go that way?

LARRY: Oh, you wind it up. I guess that's what Johnny was doing.

JAMES: Some people go like that--when they're wound up.

MISS WINTON: People! When they're wound up!

CLOCK: Cuckoo.

MISS WINTON: Oh! That scared me. Let me do it.

SARAH JANE: What'd you say, Sycamore?

SYCAMORE: Huh! Me? I never said nothin'.

SARAH JANE: I thought you did.

UNCLE BILLY: Johnny said he was going to give that clock to you, in case he couldn't make it run.

MISS WINTON: To me! What for?

UNCLE BILLY: For a bluebird box.

MISS WINTON: Oh. It's not the right shape for a bluebird house.

JAMES: Do they have to be a special shape, too?

LARRY: Do you know the dimensions, Miss Winton?

MISS WINTON: The floor should be five inches square.

LARRY: How about the depth of the cavity?

MISS WINTON: That should be eight inches.

SYCAMORE: I reckon the hole has to be in a certain place, too.

MISS WINTON: (Laughingly) Sure, six inches from the bottom. You wouldn't want the bird to have to go in its nest up side down, would you?

SARAH JANE: Make the clock strike for Sycamore.

CLOCK: Cuckoo. (All laugh)

JANES: What I want to know is why is it's bluebirds you're specializing on. Looks like they're too particular.

MISS WINTON: All birds are particular.

LARRY: The bluebird is one of our most valuable birds. I remember reading the other day that a Biological Survey showed that fifty-three percent of their diet in August and September consisted of grasshoppers.

MEDLEY OF VOICES: Grasshoppers! ... Well, I swan!

MISS WINTON: Caterpillars, too.

LARRY: Yes, and spiders and myriapods. Practically all the animal matter they eat is harmful except a few predacious beetles. That was nine percent.

MISS WINTON: You must've read the same book I did. It also said the only useful product found in stomach analysis was a few blackberry seeds and that those were probably wild.

JAMES: Don't other birds eat those things?

MISS WINTON: Sure.

JAMES: Well, why all this agitation for bluebird houses?

MISS WINTON: That's to protect them. Keep them from becoming extinct.

UNCLE BILLY: I haven't seen many bluebirds, here lately, come to think of it.

JAMES: I used to see them around the house every year.

MISS WINTON: Have you, lately?

JAMES: (Thinking for a moment) No, ma'am, I haven't.

LARRY: Some bird students are worried about the survival of the bluebird.

SYCAMORE: Reckon they would be if they eat grasshoppers. (There is light laughter) I don't see how they can eat a grasshopper. (Pause) How much of a grasshopper would it take to make fifty-three per cent? And when would a bluebird know when he'd got that much?

CLOCK: Cuckoo.

JOHNNY: Say, I looked that word up. It don't mean cute a tall.

MISS WINTON: What does it mean, Johnny?

JOHNNY: Means, queer.

MISS WINTON: (High pitched) Queer!

JOHNNY: Yes, ma'am. And you know them boxes we put up in Mr. Smith's orchard? He said there was step ladder in the tool shed right there close, and that Sycamore knew it all the time. (There are shouts of laughter mingled with exclamations as the clock goes:)

CLOCK: Cuckoo, cuckoo, cuckoo, cuckoo, cuckoo.

ANNOUNCER: We will now have a special broadcast by our staff naturalist, Mr. Larry Lansing. Come in, Larry.

LARRY: This is Larry Lansing. From my position here, which is in a bird blind erected in a large sycamore, I have a fairly good view of the little opening in the forest which lies below and before me. The huge beech which once stood proudly nearby has succumbed to time and storm, and now lies sprawled on the ground, with branches thrust in many directions. It is around this fallen trunk and among these branches that the strangest proceedings I have ever witnessed now transpire. The Cuckoo County Court is in session. The trial of Mr. Lloyd Huntington for conduct unbecoming an ornithologist is nearing an end. At the moment the prosecution and the defense are in consultation with Judge Cuckoo. Mr. Huntington has already taken the stand and been sworn in by Archie Grackle, one of the court attendants. Mr. Huntington has a reputation as a sincere and sensitive student of bird life, and for that reason it seems an odd commentary of fate that he should find himself accused of conduct not becoming his most absorbing interest in life. (His voice raises slightly as it punctuates the movement in the court room.) They're turning from the bench, now. Any moment we may hear the rapping of the gavel as administered by Harry Woodpecker. I understand that Judge Cuckoo has always followed the practice of letting his bailiff wield the symbol of authority. Hannibal Crow, the prosecutor, takes his seat and Ferdinand Jay, the counsel for the defense, remains standing. There is an interesting story--there goes the gavel. We now connect you with the

(Con't)

LARRY: (Continued) Cuckoo County--(His voice trails off as the rapping is heard above the medley of bird voices.)

HARRY WOODPECKER: Ra-a-a-a-a-a-al, ra-a-a-a-a-a-ap, ra-a-a-a-a-a-ap. (The bird sounds gradually subside.)

JUDGE CUCKOO: (With a sort of quick, go ahead tone) Cuckoo, cuckoo.

FERDINAND JAY: (With gentler tones when questioning defendant) Mr. Huntington, you have heard the charges made against you and have heard the testimony of several witnesses?

HUNTINGTON: (With prolonged enunciation of negatives and affirmatives) Yes.

FERDINAND JAY: Were you acquainted with all the witnesses?

HUNTINGTON: Yes.

FERDINAND JAY: Intimately?

HUNTINGTON: Well, no. Casually, I should say.

FERDINAND JAY: You know something of the character of each?

HUNTINGTON: Yes, I would say that I did.

FERDINAND JAY: How?

HUNTINGTON: By study--and observation.

FERDINAND JAY: Why do you study?

HUNTINGTON: Because it's interesting. It's my hobby.

FERDINAND JAY: What do you have suspended from your neck? What is it for?

HUNTINGTON: Binoculars. I use them to bring images nearer to my eyes so that I can study distant objects.

FERDINAND JAY: (Voice gradually becoming harsher) Mr. Huntington, you have heard the testimony of one (slightly sarcastic) Tillie Titmouse, in which she charged that you violated her inalienable right to privacy and peaceful pursuit of happiness through continued pointing of binoculars in her direction?

HUNTINGTON: Yes.

FERDINAND JAY: You heard her say that she had developed nervous disorders and was unable to attend her duties as a housewife?

LUNTINGTON: Yes.

FERDINAND JAY: That you had circulated rumors to the effect that she was imbued with an excess amount of curiosity, and that she had jerked out a lock of your hair to use in building her nest?

HUNTINGTON: Yes.

FERDINAND JAY: What have you to say in regard to such testimony?

HUNTINGTON: The only remark I ever made was that Mrs. Titmouse was very friendly and had once lit on my hand to get a piece of bread.

FERDINAND JAY: Was Timothy Titmouse present at the time?

HUNTINGTON: Well, I assumed that he was the gentlemen.

HANNIBAL CROW: (With harsh, strident tones) I object, your honor. This is a plain effort to discredit a witness. I demand that the defendant's reply be stricken from the record.

JUDGE CUCKOO: (Sustaining motion) Coooooo-coo.

FERDINAND JAY: (After a pause) Mr. Huntington, how do you account for the rumor to the effect that Mrs. Titmouse had extracted a lock of your hair for use in building her nest?

HUNTINGTON: That has been reported on very good authority to have happened in the state of Ohio, but I have never mentioned Mrs. Tillie Titmouse in connection with the incident. A member of the Titmouse family did do that, so I am informed.

FERDINAND JAY: Thank you, Mr. Huntington. Now, ah, you have heard the testimony of Alexander Flycatcher concerning the alleged humiliation of his wife, Cynthia Flycatcher, which resulted in a rumor, alleged to have been circulated by you, to the effect that through indolence and neglect, Cynthia, his wife, was forced to substitute celophane or onion skin for the time honored decor to their household. Did you make such a statement?

HUNTINGTON: Not about them. No, sir.

FERDINAND JAY: What did you say?

HUNTINGTON: I said that all crested flycatchers had a practice of weaving a part or all of a discarded snake skin in their nests, for what reason I did not know. I also said that there had been cases of substitution of celophane or onion skin when the snake skin was not obtainable, but I never personalized this particular lady. I really do not know what she does in that respect.

FERDINAND JAY: Do you know one Isadore Shrike?

HUNTINGTON: Yes.

FERDINAND JAY: Your honor, if it please the court, I should like to be sworn and allowed to testify in behalf of the defence.

HANNIBAL CROW: I object, your honor. The defense seeks to evade cross examination of the defendant.

FERDINAND JAY: But your honor, this is a matter---

LARRY: We break in here, ladies and gentleman, to give you the lise of jurors which we have just been able to obtain. While the attorneys are in a huddle before the bench it might be well to state that Mr. Huntington was without counsel and the only attorney willing to accept appointment from the bench was Mr. Jay. This we have just learned on good authority. The jurors are as follows: Amanda Goldfinch, Drucilda Didapper, Norman Nuthatch, Kenneth Kildee, Herman Cardinal, Gertie Grosbeak, William Coot, Theresa Tanager, Persival Swallow, Angela Chickadee, Barnabus Batter-scoot, and Letitia Kinglet. These are the members of the panel who will decide the fate of--(His voice raises) Now they are leaving the bench and in a moment we will know--apparently the defense lost that motion. Mr. Jay takes his position as--

FERDINAND JAY: Mr. Huntington, you say you know Isadore Shrike?

HUNTINGTON: Yes.

FERDINAND JAY: Is there any resemblance between Mr. Shrike and myself?

HUNTINGTON: Well, some, to a careless observer.

FERDINAND JAY: Did you at one time seek to remove the stigma attached to my person occasioned by certain rumors current in your part of the country that I was a butcher by trade, that I impaled living insects, reptiles, mammals, even fellow birds, on thorns, splinters and the like for the mere sake of cruelty?

HUNTINGTON: Yes.

FERDINAND JAY: Did you state publicly that I was not the so-called "Butcher Bird," and that name was properly applied to Isadore Shrike?

HANNIBAL CROW: I object. Isadore Shrike is not on trial in this court.

FERDINAND JAY: (Breaking in heatedly) No, he's not on trial, but the man who exonerated him from any intentional cruelty is on trial for his good name. The defendant stated publicly that Isadore Shrike impaled his food upon thorns because he did not have the strength to hold his food in his claws as would Colonel Hawk or any of his family. Your honor, the defendant is at the mercy of this court and he is entitled to all matters of truth relating to this case.

ISADORE SHRIKE: (With squeaky voice) Your honor, I ain't weak. (There is a general babel of voices)

HANNIBAL CROW: Your honor, this is an effort to whitewash the character of the defense counsel. Everyone knows that Mr. Jay is a cradle snatcher. Mr. Shrike, here, is noted for his resemblance to our good citizen, Nicolas Mockingbird. In fact, he's known to some as the "French Mockingbird."

NICOLAS MOCKINGBIRD: Your honor, I'm a private citizen and I demand the respect of officers of the law.

FERDINAND JAY: I move, your honor, that the jury be instructed to disregard all statements and accusations which were not a part of the testimony of the defendant.

JUDGE CUCKOO: (Sustaining motion) Cooooo-coo. (There is a buzz of excitement.)

HARRY WOODPECKER: Ra-a-a-a-a-a-ap. Ra-a-a-a-a-ap.

FERDINAND JAY: Your witness, Mr. Crow.

HANNIBAL CROW: (With harsh, insinuating voice) You claim to be an ornithologist?

HUNTINGTON: No, I do not.

HANNIBAL CROW: (Unable to conceal surprise) Oh, you do not. Suppose you explain your activities, then.

HUNTINGTON: I'm a student of ornithology. My interest in nature study pertains to birds, their habits, their welfare. When I see a bird that I do not know I want to identify it, know its name and learn all about its habits.

HANNIBAL CROW: What entitles one to be called an ornithologist?

HUNTINGTON: Skill in the knowledge of ornithology.

HANNIBALL CROW: Do you admit having stated that Marjorie Thrush was a poor housekeeper and that she would not make a good mother to her children?

HUNTINGTON: No. What I said was that the wood thrushes were like a lot of young women I know. Very dainty, beautiful manners, sweet voice, but messy about the home, and there was a possibility that she would neglect her children.

HANNIBAL CROW: You admit, then, that you uttered slander about one of our most admired and respected citizens?

HUNTINGTON: No, I do not, unless slander and truth are the same. Did you ever see a wood thrush's nest?

HANNIBAL CROW: The witness usually answers the questions in this court. However, I have seen the handiwork of the Thrush family and admire their skill.

HUNTINGTON: It's messy, just the same. And when a cow bird lays an egg in it and Mrs. Thrush hatches it with her own, why, she hasn't got sense enough to tell it from her own. As a result the bigger bird gets most of the food.

HANNIBAL CROW: You admit that you are not skilled in the knowledge of ornithology?

HUNTINGTON: (After a pause) Not to the extent that I would call myself an ornithologist.

HANNIBAL CROW: You associate with ornithologists?

HUNTINGTON: Yes.

HANNIBAL CROW: You hope to be an ornithologist?

HUNTINGTON: Yes.

HANNIBAL CROW: You know more about the subject than the average person?

HUNTINGTON: Y-yes. I suppose so.

HANNIBAL CROW: A great many people regard you as an ornithologist?

HUNTINGTON: Maybe.

HANNIBAL CROW: Answer, "Yes" or "No."

HUNTINGTON: Well, yes-s.

HANNIBAL CROW: Practically, then, you are an ornithologist. You do the things that ornithologists do. Your conduct is governed by the conduct of ornithologists. Is that true?

HUNTINGTON: Yes, I suppose so.

HANNIBAL CROW: There's no doubt about that in your mind?

HUNTINGTON: No.

HANNIBAL CROW: (Severely, as though pouncing upon him) Did you, on the afternoon of March thirteenth last, forcibly enter the residence of Marmaduke Buzzard of Bullitt County?

HUNTINGTON: Well, it did take a lot of will power.

HANNIBAL CROW: You admit that you did enter his residence?

HUNTINGTON: Yes, I crawled up a hollow log, and didn't have any clothespin on my nose, either.

HANNIBAL CROW: Please confine your replies to matters related to the questions. What was your object in intruding upon the privacy of his wife, Ophelia Buzzard?

HUNTINGTON: To take her picture.

HANNIBAL CROW: You knew she was in a delicate condition?

HUNTINGTON: I knew she was settin'.

HANNIBAL CROW: You had explosives with you, didn't you?

HUNTINGTON: I had flash bulbs for taking pictures.

HANNIBAL CROW: As an ornithologist, can you justify the mental distress and fright caused Mrs. Buzzard? Was it ethical to cause her to forsake her nest and endanger the lives of her expected young?

HUNTINGTON: I didn't think she'd mind having her picture "took". Most ladies don't. (There is a flurry of bird laughter.)

HARRY WOODPECKER: Ra-a-a-a-a-ap.

HANNIBAL CROW: Do you pretend to know all about birds and their habits?

HUNTINGTON: I don't pretend at all, but I have observed a great many interesting things about birds.

HANNIBAL CROW: Give an example.

HUNTINGTON: Well, take the crow family. They like to heckle the members of the eagle family, but they're always careful to stay above them. They're too big a coward to risk getting beneath them.

HANNIBAL CROW: (Stung to the quick) Your honor, the defendant is abusing and slandering a member of this court and should be cited for contempt.

JUDGE CUCKOO: (Overruling) Coo-cooooo.

HANNIBAL CROW: (Upset, unable to conceal his anger) Your honor ... may it please the court ... as prosecutor for Cuckoo County I have the right ... ah, will the court permit the prosecution to question the defendant in rudimentary phases of bird knowledge ... to indicate to the jury what I sincerely believe to be his lack of authority ... ah, knowledge on simple matters relating our fellow citizens about whom he talks so learnedly?

JUDGE CUCKOO: (Granting request) Coooooo-coo.

HANNIBAL CROW: (Savagely to Huntington) Mr. Huntington.

HUNTINGTON: (Sweetly) Yes, Mr. Crow.

HANNIBAL CROW: Since you have assumed a degree of excellence in the knowledge of bird names and habits, tell the jury what one of their fellow citizens is afflicted with feline insomnia.

HUNTINGTON: All birds of small stature would suffer loss of sleep if they knew a cat was around.

HANNIBAL CROW: The question was what bird is afflicted by feline insomnia. There is a delicate distinction in the language that may not be perceptible to an ornithologist.

HUNTINGTON: I don't know.

HANNIBAL CROW: I thought so. The answer is kittiwake.

HUNTINGTON: That is not a local bird.

HANNIBAL CROW: Never mind. Tell the jury what bird conspires against the cultivation of moss.

HUNTINGTON: A great many birds use moss in their nests.

HANNIBAL CROW: They don't use proverbs, do they? The answer is turnstone.

HUNTINGTON: What has that got to do with the cultivation of moss?

HANNIBAL CROW: Nothing. A rolling stone gathers no moss. What would a mother bird say to her youngster just before it was hatched? Suppose you tell the jury that.

HUNTINGTON: She wouldn't say anything.

HANNIBAL CROW: Again the answer is the name of a bird. No doubt the jury recalls that you professed more than average ability in identification of birds. (Pause) The answer is pipit. Now suppose you tell the jury what bird would be most likely to look for a gold brick in the crotch of a sugar tree.

HUNTINGTON: I don't know.

HANNIBAL CROW: (With glee) A sapsucker. Now tell the jury what the man did when he got familiar with the chin of a certain bereaved lady.

HUNTINGTON: (Monotonously) I don't know.

HANNIBAL CROW: Chuck will's widow, of course. If the bills of twelve dozen birds were converted into one bird with twelve dozen bills, what kind of a bird would it be, Mr. Ornithologist?

HUNTINGTON: (Weakly) I don't know.

FERDINAND JAY: Your honor, I protest at this deliberate attempt to browbeat, intimidate---

HANNIBAL CROW: (Breaking in) And expose, your honor. That is an important word the defense is not likely to include in his objection.

HARRY WOODPECKER: (As a chattering sound swells forth from the spectators) Ra-a-a-a-a-ap!

FERDINAND JAY: These are trick questions, your honor, and do not have a place in a court of law. They are designed to becloud the issues involved, in this case--a case where a man's reputation is at stake.

JUDGE CUCKOO: (Demanding order as the chattering subsides) Cuckoo, cuckoo, cuckoo ... The court disagrees with the counsel for the defense relative to the pertinency of testimony just heard. It relates to persons, habits, and incidents commonly known and understood by the citizens of this county, and for that reason would be admissable in this court or, in the opinion of the bench, in any court of competent jurisdiction. However, it is held by this court that the defendant, by his inability to answer the most elementary of questions pertaining to ornithology, has shown that he is not sufficiently versed in the science of ornithology to sustain, maintain, or proclaim such ~~necessary~~ to the pursuit of such vocation, avocation, or hobby. It has been charged that Lloyd Huntington has conducted himself in a manner unbecoming an ornithologist. Since it has been shown that he is not an ornithologist and has little prospect of ever becoming an ornithologist it is unreasonable to assume that he can be charged with conduct unbecoming said vocation. Though it may be regarded as reprehensible for an ornithologist not to know a

(Con'd)

JUDGE CUCKOO: (Continued) bird when he sees it, it must be regarded as a greater offense for a bird not to know an ornithologist, The case against Lloyd Huntington is, therefore, dismissed. Court is adjourned. (There is a regular babel of bird sounds.)

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