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BULLETIN
OF THE
UNIVERSITY OF TEXAS

No. 79

SCIENTIFIC SERIES NO. 8

The Protection of Our Native Birds

BY

Thos. H. Montgomery, Jr.
Professor of Zoology



*Entered as second-class mail matter at the postoffice at Austin, Texas
October 1, 1906.*

Monograph

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THE PROTECTION OF OUR NATIVE BIRDS.

THOS. H. MONTGOMERY, JR.

Professor of Zoology.

The protection of our native birds is a subject that has been treated many times and from a variety of points of view. But it is a matter of such economic importance, particularly to agriculturists, that it can not be too often brought to the attention of the reasoning public. For it is truly surprising how much ignorance about birds obtains with those who would greatly benefit by some accurate knowledge. Especially in Texas has there has been very little agitation for their protection.

Congress recognized the necessity of such protection by establishing a Section of Economic Ornithology in 1885, as a branch of the Department of Agriculture, and in 1896 enlarged its scope by expanding it into the Division of the Biological Survey. Under the able direction of Dr. Merriam a great amount of important work has been done by this Survey, with the help of a corps of competent assistants, and a series of valuable reports has been issued upon the food relations of birds. Further examination of the questions has been carried on by several of the States, notably Massachusetts, Illinois and Pennsylvania, all of which has emphasized the incalculable economic value of the birds, and this has again been supported by the private studies of many naturalists.

My own observations commenced in 1885, twenty years ago, when I entered in my ornithological diaries the data of the contents of many stomachs of birds, from personal examinations, so that I convinced myself of the economic value of birds before I had become acquainted with any of the literature, and indeed at a time when there was but little published on the subject. Work along very different lines of research has drawn me away from these earlier studies, but I have continued to realize the value of the subject, and it is now a pleasure to speak for the cause of the birds.

There may be considered in succession the reason for protection, the data on destruction, and the means of protection.

A—REASONS FOR PROTECTION.

These may be grouped under the main heads of value of birds to agriculture, value as disease preventers, value from the aesthetic standpoint.

I. Agricultural Value.

The relation of birds to agriculture is one of diet, and we rank them as harmful or beneficial according to the food on which they subsist.

While some birds have a strictly specialized diet, as, for instance, the greater number of the oceanic species, others have a more or less mixed regimen, are more or less generalized in their diet, and on this account it is impossible to arrange birds into sharply demarcated groups according to their feeding habits. Then the diet may vary with the season of the year. Thus, with many of the smaller land birds, insects compose the food during the hot months, wild seeds and berries during the cold season. Again, in many species where the adults are more or less vegetarian, devouring seeds or grains, it is the general rule that the nestlings are fed upon insects. Highly specialized diet would indeed be rather the exception, for birds with such a diet would, perhaps, have to contend with a severer struggle for existence. For reasons such as these, it is difficult to establish any satisfactory classification based upon food, yet one must be made if we would find the relations of birds to agriculture. In the arrangement that is proposed below I have estimated as carefully as one may from the available statistics, and from the nature of the birds' habits, the average annual diet of our North American species. As a basis, I have taken Dr. Coues's "Key to North American Birds," fifth edition, 1903, wherein there are recognized some 932 species, geographical races excluded, as occurring on the continent of North America, north of the Mexican boundary, and including Greenland and Lower California.

For better convenience in the following discussion, it is advisable to treat the hawks and owls separately from the other species.

a. Birds with the Exclusion of the Hawks and Owls.

These number 874 kinds. Two main dietary groups of them may be distinguished: those with terrestrial food, food secured on

the dry land and its vegetation, and in the atmosphere above it; and those with aquatic food, food obtained in water or in or upon marshy ground, such food being aquatic or amphibious. Under each of these sub-groups may be established, and the number of species in each sub-group may be tabulated as a percentage of the 874 species entered in these lists.

(a) With terrestrial food.

- (1) Food mainly insects..... 36.7 %
- (2) Food mainly wild seeds, berries, buds, but also insects 13.6 %
- (3) Food to considerable extent cultivated grain and fruit 1.8 %
- (4) Food mainly carrion..... .3 %

(b) With aquatic and amphibious food.

- (5) Food mainly fish..... 17.0 %
- (6) Food a combination of aquatic plants and fish.. 6.0 %
- (7) Food crustacéa, molluscs, insects, worms..... 8.0 %
- (8) Food a combination of amphibians, reptiles, molluscs, fish..... 4.8 %

Each of these groups we may briefly consider by itself:

(1) In the first group, there are a large number of birds that are almost wholly insectivorous, such as the kinglets, titmice, nuthatches, creepers, warblers, tanagers, orioles, swallows, vireos (greenlets), flycatchers, hummingbirds, swifts, goatsuckers; and others where the insect diet predominates, but where seeds, berries and fruits are eaten at certain seasons of the year, such as the thrushes (including the robin and bluebird), the cedarbird, cuckoos, certain of the sparrows and finches (perhaps a third of them), the cowbirds, woodpeckers and meadow larks (field larks, as they are known in Texas), the shore larks and the wrens. This class of birds comprises some 36.7 per cent of all that we are at present considering, and there can be no question that all of them are to be vigorously protected for the interests of the farmer.

The robins will at times destroy a certain amount of small garden fruits, as will the catbirds and cedarbirds; but all feed their nestlings upon insects, and the diet of the adults during the greater portion of the year is the same.

The name night hawk has been improperly applied to one of

our common goatsuckers, a group that includes the whip-poor-will; and because of this name alone these birds are frequently supposed to be pests; but an examination of the feeble bill, the feet that are almost too weak for perching, and the bristles around the grape demonstrates that these birds are highly specialized for catching insects on the wing. The older name of goat-sucker arose in Europe from the entirely baseless supposition that they sucked the milk from goats.

The common field larks have been carefully studied, with the result of finding that their food during three-fourths of the year is composed of insects, notably grasshoppers, cutworms and boll weevils, and during the winter to large extent of the seeds of weeds.

It is difficult to know exactly how to group the shrikes or butcher birds, but there is no doubt of their economic value; Dr. Judd examined the stomachs of 67 specimens, and found that 26 per cent of the food consisted of mice, 34 per cent of many small birds (including English sparrows), and 40 per cent of insects (mainly grasshoppers).

(2) The second group consists of birds in whose regimen wild seeds and berries predominate, but all which destroy insects to greater or less extent. Among these are found the greater number of the wild sparrows and finches, the yellow-headed blackbirds, the magpies and jays, the pigeons, grouse and quail. More than half of these are species of wild sparrows, and these feed their young almost entirely upon insects, while the adults of most of them use the same food as long as it is obtainable.

But in all of these birds, insects compose a considerable portion of the diet, averaging perhaps a third; so that if we add their number to that of the preceding class we find that quite 50 per cent of the 874 species that we are at present considering feed mainly, or to considerable extent, upon insects. In any inland district where aquatic birds would be few in number, as for instance in the neighborhood of San Antonio, the percentage of such birds would rise close to 90 per cent.

The remainder of the food of these birds consist of wild seeds and berries, to a minimal extent of fruits or buds. The element that predominates is the seeds of weeds, and yet our farmers seem hardly to recognize that birds are their main weed destroy-

ers. Perhaps the most efficient weed destroyers are the wild pigeons and the quail. The common wild pigeon or dove has been proved to subsist almost entirely upon the seeds of weeds. Dr. Judd has shown that the quail or bob-white, at least in the Eastern States, destroys nearly as many weeds as do the wild pigeons, and that 14 per cent of its food consists of insects, abundant among them potato and squash beetles, boll weevils, chinch bugs, grasshoppers and cutworms.

We have now briefly reviewed the two classes of birds that are of most value to the agriculturist, those that feed mainly or considerably upon insects. Now, a very considerable portion of the insects that birds eat are harmful to agriculture, in that they feed upon plants that man needs for his own uses. There are, to be sure, beneficial insects, such as the dragonflies that catch mosquitoes, the numerous minute flies and wasps that parasitize other insects, and certain beetles that bury carrion. But by far the greater number of insects are vegetarian in habit, and for this reason all those birds that kill them should be rigorously protected in the interests of the farmer. Then we have seen, at the same time, that many of these birds are useful in still another way, as very efficient weed destroyers.

The main enemies of insects, next to their own diseases and parasites, are the birds. And we are justified in concluding, and it is no exaggeration, that in inland districts without the aid of birds agriculture would be a failure, and probably even man himself could not exist in the warmer and temperate parts of the globe. For naturalists have long pointed out that there is a balance in Nature, an oscillating equilibrium between the different kinds of organisms, whereby the diminution of one means and necessitates the increase of another. This is a biological phenomenon so amply substantiated that no argument is necessary for it here. All animal life depends in the long run upon vegetation for its food. Birds feed upon the insects that browse upon the vegetation. In direct proportion as the birds are decimated, the numbers of insects will increase and the cultivated crops suffer. There was a time in southern France when the birds became so reduced in numbers by thoughtless killing that for a succession of years the crops were failures. The Government had finally to step in with rigid statutes against further destruction, and had even to import and liberate numbers of wild birds in

order to obviate national famine. Probably Longfellow had this incident in mind when he wrote his "Birds of Killingworth," a strong appeal that everyone should read.

To determine how many insects are killed by an individual bird in a given period of time is a difficult matter and needs long-continued observation. Most of our smaller land birds raise two broods of about five young each annually. The young grow rapidly, and are so constantly demanding food that usually both parents have to act as nurses and are continually kept going to and fro searching for and bringing food to their nestlings. How arduous this task of feeding the young is, is shown by the fact that just after the breeding season, toward the close of the summer, the parents are in worn plumage and greatly weakened. Indeed, with their incessant food catching from sunrise to sunset, the parents are barely able to keep the young sufficiently supplied. Personally, I have examined hundreds of stomachs of our smaller birds, and found that each would average quite a hundred insects of various sizes. Particularly desired by the nestlings are those juicy crickets, grasshoppers and caterpillars that are so destructive to vegetation. A convincing chapter bearing on this subject is found in the work of Weed and Dearborn, "Birds in Their Relations to Man."

(3) Birds with food consisting to considerable extent of cultivated grain and fruits. Here there comes in the first place the common English sparrow, that songless foreigner that seems to have extended itself across our continent as far as the railroads have progressed. For two counts this bird should meet with no protection, but rather with the united opposition of all: first, because it has driven away from the neighborhood of our towns the greater number of the smaller native species that are of agricultural value; and second, because it has become a serious menace to the grain fields. I have opened 78 stomachs of these birds, killed in Pennsylvania, and found 32 of them to contain nothing but grain (wheat, corn, oats), 28 to contain grain together with wild seeds, 16 to contain wild seeds only, 1 to contain apple blossoms, and only 1 to contain insects. Much more extensive observations have been made by others, notably those of Dr. Riley based upon an examination of 522 stomachs; and there is a consensus of opinion that while the young are fed to some extent upon insects the adults have a diet that consists to very large

extent of cultivated grains, and includes the buds and fruits of other plants. An English ornithologist studied for a year the food of the English sparrow, and found, in an excerpt given by Weed and Dearborn, that in the adults "75 per cent of the food consisted of wheat and small grains, 10 per cent of seeds of weeds, 4 per cent of green peas, 3 per cent of beetles, 2 per cent of caterpillars, 1 per cent of flying insects, and 5 per cent of other things. During the first sixteen days of the nestlings' life, 40 per cent of the food consisted of small grains, 40 per cent of caterpillars, and 10 per cent of small beetles."

As to the common blackbird or grackle, the farmer generally believes he does great harm. Yet Benjamin Franklin wrote in 1753, in a letter to Peter Collinson:*

"Whenever we attempt to amend the scheme of Providence, and to interfere with the government of the world, we had need to be very circumspect, lest we do more harm than good. In New England they once thought blackbirds useless, and mischievous to the corn. They made efforts to destroy them. The consequence was, the blackbirds were diminished; but a kind of worm, which devoured their grass, and which the blackbirds used to feed on, increased prodigiously; then, finding their loss in grass much greater than their saving in corn, they wished again for their blackbirds." And Beal writes, as the result of numerous careful investigations:**

"The total grain consumed during the year constitutes 45 per cent of the whole food, but it is safe to say that at least half is waste grain, and consequently of no value. During the breeding season, however, the species does much good by eating insects and by feeding them to its young, which are reared almost entirely upon this food. The bird does the greatest amount of good in spring, when it follows the plow in search of large grubworms."

The crow also has his good side; his habits have been summed up by Barrows as follows:†

"(1) Crows seriously damage the corn crop, and injure other grain crops usually to a less extent. (2) They damage other

*Franklin's Works, ed. Bigelow, 1887, II, p. 292.

**F. E. L. Beal, Some Common Birds in Their Relation to Agriculture, Farmers Bulletin No. 54, U. S. Dept. Agric. 1904.

†Barrows and Schwarz, The Common Crow in the United States, U. S. Dept. Agric., Div. of Ornith., Bulletin No. 6, 1895.

farm crops to some extent, frequently doing much mischief. (3) They are very destructive to the eggs and young of domesticated fowls. (4) They do incalculable damage to the eggs and young of native birds. (5) They do much harm by the distribution of seeds of poison-ivy, poison-sumach, and perhaps other noxious plants. (6) They do much harm by the destruction of beneficial insects. On the other hand, (1) They do much good by the destruction of injurious insects. (2) They are largely beneficial through their destruction of mice and other rodents. (3) They are valuable occasionally as scavengers." and Beal (*l. c.*) concludes: "In the more thickly settled parts of the country it probably does more good than harm, at least when ordinary precautions are taken to protect young poultry and newly-planted corn against its depredations."

The bobolink is the name given in the North to that bird in its brightest plumage which is known there in its Fall plumage as the reedbird, and in the South as the ricebird. During the summer in the North it is mainly an insect feeder, but during its winter sojourn in the South it certainly does great damage to the rice fields. It is one of the few instances in this country of a bird that does good in one section and damage in another.

The common bluejay has a regimen much like that of the crow, but observations made by the Department of Agriculture have shown that only 18 per cent of its food is corn, that it prefers nuts and wild seeds to corn; in the summer it probably destroys more insects than does the crow.

Wild geese sometimes do considerable damage to grain fields in the Western States, during their migrations, but this is the case only in the more thinly-settled districts.

The only other birds that consume grain to any marked extent are the red-winged and yellow-headed blackbirds and the wild pigeons; but grain is an unusual diet with the last-named species, as we have seen, and the others have been proved by their services as insect destroyers to be on the whole much more beneficial to the farmer than otherwise. On the red-winged blackbird the Department of Agriculture has made broad studies, in an examination of 725 stomachs, which shows that some seven-eighths of its food consists of noxious insects and weed seeds, and grain only 13 per cent; at occasional localities they do considerable harm to

the rice and wheat, but over most of their range they are to be reckoned as good friends of the farmer.

(4) Those birds whose food is mainly carrion we will consider in another place.

(5) Those birds that have a diet consisting mainly of fish are the kingfishers, mergansers (sea ducks), gannets, pelicans, cormorants, snake birds, frigate birds, jaegers, gulls and terns, albatrosses and petrels, loons, grebes and auks. The greater number of these are limited to the sea coasts, so that they bear little relation to the farming industry; but others of them are mainly inland in distribution, as the kingfishers, while in occasional districts occur inland colonies of gulls, pelicans and cormorants. Perhaps none of these birds are to be considered particularly beneficial in point of diet, but at the same time it may be said that they do but little injury to pisciculture. For most of the fish they secure are probably weak and immature individuals, whereby they aid Nature to weed out the unfit; and, further, a considerable part of their regimen consists of fishes that man does not seek.

Many fish-eating birds are infected by internal parasites that live also in fishes, the fish being the primary and the bird the secondary host of the same species of parasite; the bird infects itself by devouring the flesh of an infected fish, then through its excrement distributes the eggs of the parasite to the water again, the young from such eggs then entering fishes. But in this cycle the bird does no more harm to the fish than the fish to the bird; and it is questionable whether destruction of the birds would materially lessen the number of fish parasites.

Gulls and terns that breed inland replace their fish diet to considerable extent by one of insects and worms; and in Nebraska I have watched flocks of large white gulls following the furrow of the plough, picking up grubs and earth worms. Pelicans in similar localities have been proved to destroy many locusts.

(6) Another group of birds combines a diet of aquatic plants, stems and seeds, with molluscs, crustaceans and, perhaps to less extent, fish. They are those birds with a straining bill, such as the flamingoes, the swans, geese and most of the ducks except the mergansers. All of these destroy great numbers of aquatic insects when they feed along streams and rivers while on their migrations. The water plants they eat are of little economic value, and the number of fish they destroy but small. All of them are

to be ranked as rather beneficial, though, as we pointed out before, certain of the wild geese do damage to grain fields.

(7) Birds whose food is a combination of insects, crustaceans, insects and worms, are the dipper (a bird related to the thrushes), the plover, surfbirds, turnstones, oyster-catchers, stilts, phalaropes, snipe, sandpiper and woodcock. Some of these have a slender bill fitted for probing in the mud and sand, but others, as the plover, have the tip of the bill hardened. By far the greater number of these birds are restricted to the sea coasts, and most of them migrate there also; but certain of the plover, snipe and sandpipers breed in inland districts, and these migrate also along river courses. On the sea coasts the food of these birds consists mainly of small molluscs and crustacea that the birds find under pebbles or probe out of the sand. In inland regions an insect diet predominates; and our commonest resident plover, the kildeer, feeds almost entirely upon insects. It never destroys turnips, as the farmers commonly suppose, but on the farms feeds upon the insects that are so harmful to the turnip crop. The woodcock feeds to a great extent upon small worms.

(8) Finally, there is a group of amphibious birds whose diet is not very dissimilar from that of the preceding group, consisting mainly of larger organisms, such as reptiles, amphibians (frogs and newts) and mice and fish, along with larger crustacea, molluscs and worms. These are mainly birds of considerable size, such as the cranes, storks, herons, spoonbills, ibises and coots, with some of smaller size, such as the rails. They do harm by killing frogs, which are great insect destroyers, but counterbalance this by destroying wild mice and snakes.

b. The Hawks and Owls.

There are on our continent some 19 species of owls, and 39 species of hawks, kites, and eagles. The average farmer considers all of these to be harmful to poultry and game, and many of the States had originally laws to secure their extermination.

But Warren* pointed out the error of the farmers in this matter, and was largely instrumental in obtaining the repeal of such noxious laws. The most important contribution on the subject is that of Fisher,** which states the results of the examination

*Report on the Birds of Pennsylvania, Harrisburg, 1888; second revised edition, 1890.

**The Hawks and Owls of the United States in Their Relation to Agriculture, U. S. Dept. Agric., Div. of Ornith. and Mamm., Bulletin No. 3, 1893.

of some 2600 stomachs of these birds. For the detailed diet of each species, the reader must refer to the original memoir, for here there is space for only the general results. From Dr. Fisher's summaries of those stomachs that contained food, I have estimated the following rough percentages:

Containing game birds or poultry.....	6 %
Containing mammals other than mice.....	15 %
Containing mice	33 %
Containing birds other than poultry or game.....	18 %
Containing insects	24 %

The fewest exhibited poultry or game birds, four times as many contained insects, and eight times as many mice, rats, squirrels, gophers, rabbits, foxes and other noxious mammals. Fisher's general conclusions are: "(1) That owls are among the most beneficial of all birds, inflicting very little damage upon the poulterer and conferring vast benefits upon the farmer. (2) That all hawks, with possibly one or two exceptions, are to some extent beneficial to the farmer." He finds that all the killing of game and poultry by hawks is done by only six species: the goshawk, gyrfaloon, duck hawk, fish hawk, sharp-shinned and Cooper's hawk; of which the first three are rare in the United States, and the fourth present only on the coasts. These are the only hawks that should be placed upon the blacklist, from the standpoint of the poulterer, though all of them destroy many mice. Those "whose beneficial and noxious qualities about balance one another" are the "golden eagle, bald eagle, pigeon hawk, Richardson's hawk, aplomado, and prairie falcons;" all the other hawks are wholly or chiefly beneficial. The only owl whose good qualities do not far outweigh its bad ones is the great horned owl, "which in the East is persistent in its attacks upon poultry and game, in the rabbit-infested portions of the West destroys such immense numbers of these rodents that its assistance is invaluable to the farmer."

Many of the hawks destroy more insects than any other food. Such is the case with the little sparrow hawk; and Swainson's hawk, the most abundant large hawk in Texas, is a tremendous grasshopper killer, as well as a destroyer of gophers, while it apparently never touches poultry; flocks of them are to be found wherever the grasshoppers are unusually numerous, for they seem

to prefer this diet. Then in the long stretch of country on the coast between Corpus Christi and Brownsville, I was astonished at the great number of hawks, especially Harris' hawk. Mr. Sennett wrote of its food in this region: "I found in the crops of those I obtained mice, lizards, birds and often the Mexican striped gopher" (*Bull. U. S. Geol. and Geogr. Survey of the Territories*, 5.); and I have little doubt that it is the gophers that have drawn them to that locality in such numbers.

All the owls, with the one exception mentioned, are to be considered highly beneficial to the farmer, since they feed to very large extent upon field mice. An owl is the natural mouse trap of the countryside, as the cat is of the house. In this connection may be mentioned my own observations,* data secured not by killing the birds to examine their stomachs, but by collecting and examining the solid pellets of hair and bones that they eject from the mouth after feeding. At my old home near Philadelphia I opened and noted the contents of every pellet dropped at the roost by four long-eared owls, from Christmas Day, 1898, to February 22 following, with the following results: there were remains of 2 small birds, 1 shrew; 2 white-footed mice, 1 house mouse, and 343 field mice; these field mice were large voles of the genus *Microtus*, that do much damage to the grass in pastures. Yet these were the contents of only those pellets that they dropped at the daily roosting tree; doubtless they ejected quite as many others while on the hunt, but of these I could get no record. Then these beautiful birds were shot by a taxidermist! The common burrowing owl of Texas feeds mainly upon young prairie dogs, gophers, mice, lizards and insects. Of the little screech owl, Fisher gives the following summary: "Of 255 stomachs examined, 1 contained poultry; 38, other birds; 91, mice; 11, other mammals; 2, lizards; 4, batrachians; 1, fish; 100, insects; 5, spiders; 9, crawfish; 7, miscellaneous; 2, scorpions; 2, earthworms; and 43 were empty." Of the large barred owl, a bird of woodland regions, which the farmer generally regards as harmful, Fisher states: "Of 109 stomachs examined, 5 contained poultry or game; 13, other birds; 46, mice; 18, other mammals; 4, frogs; 1, a lizard; 2, fish; 14, insects; 2, spiders; 9, crawfish; and 20 were empty."

There can be no question that the natural enemies of the prairie

*Observations on Owls, with Particular Regard to Their Feeding Habits, *American Naturalist*, 33, 1899.

dogs, rabbits, gophers, rats and mice of this Southwestern country are the hawks and owls, and the farmers should know it. In Texas but two hawks and one species of owl are not distinctly beneficial, and unless the farmer is sufficiently familiar with birds to distinguish these from the others it would be for his best interests to avoid shooting any hawk or owl at all. Hawks are like men in that within the same species there may be bad as well as good individuals. To eat poultry is an acquired taste with them, and those few individuals that have learned it give a bad name to the majority that never touch this food. That is to say, because one individual hawk or owl may visit the poultry yard, we may not infer this to be in any way a general habit of the species; the farmer should shoot that harmful individual, but not enter on a war against the others that are killing his gophers and field mice. As long ago as 1882, Spencer F. Baird, one of the most prominent naturalists of this country, wrote (*Journ. Cincinnati Soc. Nat. Hist.*, 5): "The destruction of hawks will save an occasional fowl, but will cause a great increase in the abundance of field mice, rabbits, squirrels, snakes, frogs, etc., upon which the hawks feed. It has now been conclusively shown, I think, that hawks perform an important function in maintaining in good condition the stock of game birds, by capturing the weak and sickly, and thus preventing reproduction from unhealthy parents. One of the most plausible hypotheses explanatory of the occasional outbreaks of disease among the grouse of Scotland has been the extermination of these correctives, the disease being most virulent where the game-keepers were most active in destroying what they considered vermin. It is my firm conviction that in the average of well-settled countries the hawks and owls are a benefit rather than the reverse to the community in general, and to the farmer in particular." And this is the opinion of all whose knowledge makes them competent judges.

II. Value as Preventers of Disease.

Birds aid in preventing disease by destroying carrion, as well as by killing disease-transmitting insects.

The vultures, the black vulture, turkey buzzard, and California vulture, rank first as destroyers of refuse; the last of these is now nearly, if not quite, extinct. For many years in many of the

cities of the South the turkey buzzards and black vultures constituted the only efficient health departments, and in some they are still the most active, destroying the filth thrown out into the streets. Their value in doing away with the putrefying carcasses can hardly be estimated, and there can be little question that they prevent much contamination by this act. There seems now to be some evidence that these birds may transmit the germs of cattle fever, but we should be cautious about deciding to kill them on that account. The case must first be proved more definitely against them; and next, it must be decided whether the harm they do in this way outweighs the good they accomplish in removing decomposing matter. For, though they may transmit disease to cattle, they unquestionably help in checking the sources of certain human disorders.

The Mexican eagle, or caracara, common along the southern border of Texas, is also an important carrion destroyer and it and the road-runner (chaparral cock, paisano bird) are our most efficient snake killers. In the same way the gulls prevent the accumulation of refuse in our harbors. The crow is also a scavenger.

Studies of the past fifteen years have demonstrated that mosquitoes are the transmitters of malaria and yellow fever, the tsetse fly of Africa of the fatal sleeping sickness (trypanosomiasis), and house flies of typhoid and probably other diseases. Swallows, swifts, flycatchers and warblers are the most efficient destroyers of flies, as the crepuscular night-hawks and whip-poor-wills of mosquitoes. There has yet to be undertaken the study of birds as preventers of human disorders.

III. Aesthetic Value.

The argument from the standpoint of the beauty and charm of birds can appeal only to those of refined sensibilities, those with a mind recipient of the beauty in the living world. Even the man who prides himself upon his hard-headed common-sense must grant that he would miss the songs of birds were the present destruction of birds to continue. People are learning more and more to spend their vacation seasons further from the popular resorts, and if they analyze their motives in doing so they will find it is as much on account of the less disturbed natural surroundings as of the greater rest and quiet. Of all animals, the

birds appeal to us most strongly because most of them are active in the daytime, most are bright-colored, and especially because they are the only animals with complicated songs. They are the most neighborly of all creatures, the most winning. Whether one hears the early song of the robin upon the lawn, or the cooling, delicious notes of the canyon wren in a wild ravine of the mountain desert, he may find pleasure and learn that despite human cares there is happiness in Nature as well as a struggle for existence, and relief in the return to Nature. Is it not our boast that every home has its honeysuckle vine, and that upon every honeysuckle there sings a mockingbird? Indeed, the greater extent of this State would be dull and sombre without the refreshing songs that spring from the chaparral, and the nights saddening without the soft call of the whip-poor-will. Many profess a contempt or indifference for such things, and they are to be pitied; but even such men would miss them were they removed.

For the same aesthetic reason that America has protected the Yellowstone Park, and is now agitating to prevent the demolition of Niagara Falls, bird life also should be protected.

B. DATA ON THE DESTRUCTION OF BIRDS.

Everyone who has watched attentively the wild birds of a given locality has observed that the number of them, or at least of certain of them, decreases as the human population swells. I have convinced myself of this fact for the region of Chester County, Pennsylvania, where much of my time was given to field observations of birds from 1885 to 1903; there it was particularly noticeable in the case of the blackbirds and wild pigeons (mourning doves), the red-tailed hawk and great blue heron, the red-headed woodpeckers and bluebirds; and doubtless it was the case also with most of the smaller birds whose numerical proportions are more difficult to estimate.

Among the American birds that have become extinct within historic times are the great auk and Labrador duck; the passenger pigeon, which, according to the accounts of the pioneer ornithologists, particularly Catesby, Wilson and Audubon, formerly occurred in flocks numbering each many million individuals, is now almost extinct; the Carolina parrot, the ivory-billed woodpecker, the great California vulture, the golden eagle, and others, have nearly reached extinction on this continent.

This naturally leads us to ask, what are the main agencies in such decimation?

On the one hand, there are the natural causes. The most powerful of these are parasites and disease epidemics. Certain birds, particularly those of carnivorous diet, are more or less infected with serious internal parasites within the intestinal tract and in other parts of the body; then nearly each species has its peculiar ectoparasitic forms, notably insects of the group of the Mallophaga. The presence of malaria, tuberculosis and other diseases has been constated for a number of species. Then there is destruction by other natural sources, particularly cats and snakes, climatic severities, the wasting of breeding and feeding grounds by forest and prairie fires; and all those agencies that constitute the hard struggle for food. All these are the natural checks to the undue increase of individuals; they seem to occasion annual fluctuations of the number within a species, but they tend also to keep the number within a more or less constant ratio and probably rarely produce rapid extinction. In other words, Nature may be trusted to keep her own proper equilibrium.

On the other hand, there is the agency of man in causing decimation of the wild animals around him; and his attacks have generally far severer consequences than those we have just mentioned. Such destruction we are in a position to check. We may here consider briefly its more important forms.

I. Destruction for Food and Sport.

In any more or less cultivated country man has no need to kill wild animals for food, because for his meats he raises cattle and poultry.

But man continues to have a strong hunting propensity, perhaps most developed in the Anglo-Saxon, and finds a keen delight in the chase. In this way it comes about that he classes certain of the larger birds as game, those that are good to eat and require skill and hunter's craft to procure. This taste for hunting is an old one, healthful and natural; it is really not a love of the killing so much as a pleasure in the excitement of the chase. It would appear to be a mistake to try to stamp it out, for there are no other out-of-door recreations that quite take its place. Such sport implies no intended cruelty.

Yet undoubtedly such trapping and shooting is rapidly exterminating some of our birds. Thus, a hundred and fifty years ago the brant geese were exceedingly abundant upon the Delaware River; now they never even stop there during their migrations, but in greatly lessened numbers make their first halt further to the south. The prairie chicken is now exterminated east of the Mississippi River, except for a few left upon the Island of Martha's Vineyard; and the canvasback duck is becoming scarce in the East. These are but indications of how the number of all the larger game birds must be decreasing, and how total annihilation is to be expected unless a limit be placed upon the numbers that should be killed.

Here we must distinguish between the good sportsman, who relishes the hunt, who does not wish to kill every bird within range, but respects the laws and is satisfied with a moderate bag, knowing that he has left sufficient birds to bring up broods in the next season; and the game-hog, as he is now called, whose chief aim is to kill more than anyone else, who means to discharge every cartridge he has, who in the absence of game wardens does not respect any laws, and who shoots birds because they are cheaper than clay pigeons.

Then there is the still more numerous army of boys equipped with their first guns. To them, anything that flies is fair game, and shooting into a flock is honorable. Yet they are not to be blamed so much as their parents, who, to instigate a mistaken idea of manliness, entrust youngsters with so destructive a weapon as a gun. At the outskirts of most of our country towns the small boy is always to be seen prowling around with bean-shooter, air-rifle, or gun. When one stops to compute how many small towns there are, how many small boys in each, how much leisure most of these boys have, one may well wonder how the birds maintain themselves as well as they do.

II. Destruction of Eggs.

Oceanic birds usually nest in large colonies of hundreds or thousands of individuals upon fringing reefs or rocky islands, often in localities that are quite accessible. At such places enormous destruction has been wrought by systematic egg hunters. Sometimes it has happened that a ship's crew, for mere amuse-

ment, have landed and broken all the eggs in sight. Again, a regular business has been made of gathering eggs, with the hope of marketing them either as eggs or as oil or fertilizer. At various points along our Texas coast this has been done extensively, notably upon Padre Island, with the result of an awful carnage and little or no monetary profits for the undertaking; this particular island, once the breeding ground of tens of thousands of gulls, pelicans and herons, is now almost bare of big birds. There has been similar carnage near San Francisco. By such means birds that nest in restricted localities become quickly exterminated. For, though the sea birds range far and wide in search of food, and often take long periodical migrations, their nesting grounds are usually very limited in extent, so that he who enters them at the proper season has it in his power to destroy thousands of individuals in a day. To the eye of the ornithologist nothing is sadder than such depopulated islands and beaches.

Inland birds do not nest in that manner, if we except colonies of crows, herons and fish hawks; consequently, no hunting of eggs for market purposes is feasible there. But perhaps at least one out of four small country boys hunts for nests at some portion of his life, and I would be inclined to think that the number of birds killed in this way is greater than the number destroyed by full-grown sportsmen. Usually it is with the boy only an amusement that lasts but a few years; he collects eggs as he does postage stamps; he may blow them and "start a collection," or string them together, or use them as puerile wampum for exchange. But sooner or later the collection is discarded, the boy has learned thereby little or nothing about the birds, he has grown to value bird life very cheaply.

The adult egg collector, or oölogist as with a peculiar pride he styles himself, chooses a little more carefully, keeps his collections in good order, keeps full records, and endeavors to make accurate identifications—the latter frequently necessitating the shooting of the parent birds. The oölogist generally desires complete sets of eggs of all the species that he can obtain, particularly of all those found in his neighborhood; of the rarer ones he takes all he can secure, of the commoner ones all that are necessary to show the range of color variations. In this he justifies himself by saying that he is doing it "for scientific purposes," and the law usually allows him to do it "for scientific purposes." But what is he col-

lecting? Not really eggs, but merely empty egg shells, that mineral covering of the true egg that least of all teaches of the bird and its life. He takes great pains to remove any trace of the embryo, in which the true scientist knows lies bound up all the secrets of development and heredity. A collection of embryos of our birds would be very valuable, because it could be made the basis of many explanations, but no oölogist has made one, and trays full of empty egg shells have taught us almost nothing. There is no scientific need of securing further great series of specimens to show every possible range of color and size, for we already know the number of eggs and their general color markings for the greater number of American birds; and yet this knowledge has given little of value to biological interpretation. There is absolutely no science in mere accumulation and description; we need the explanation; oölogists have explained nothing, and they never will on the basis of empty shells. Ninety-nine out of every hundred oölogists have no right whatsoever to the name of scientists. And to "collect eggs for scientific purposes" in the way they are doing it is a contradiction in terms and should be prohibited by law. The considerable number of dealers in the egg shells of birds attests how great this practice is, and how much money must be annually expended in it.

Not only with every egg taken or nest despoiled is a bird killed, but further harm is done in the way of the adult birds' abandoning the locality where the tragedy happens. If the eggs are quite fresh, or even up to the time of hatching of the nestlings, the parents in most birds will abandon the nest and move to another region, for the maternal instinct is usually at first weakest, and does not reach its maximum until the young are ready to leave the nest. Often the slightest disturbance of the nest, without removal of the eggs, will cause the parents to leave it.

It is exceedingly difficult to secure even roughly approximate statistics in regard to the harm done by the destruction of eggs. I believe no one has attempted to compute it. But it would be hardly an over-estimation to conclude that more harm is done in this way than by the sportsmen considered in the previous section.

III. Destruction for Millinery Purposes.

A third most potent mode of destruction is killing to secure skins and feathers for wearing apparel. Certain peoples of Central

America used to make brilliant robes of the skins of humming-birds, hundreds of these tiny forms being necessary for one such covering. These were what we would call barbarous races. But the women of modern civilization are destroying far more birds than their savage predecessors. Look at the hats and bonnets in a church, or at an afternoon tea; how many of them are without feathers of some description? The modistes find it more economical to use the natural bright feathers of wild birds than the dyed feathers of domestic ones, and, consequently, the wholesale killing of song birds to furbish hats.

Reliable statistics on this kind of destruction were published some years ago by a special committee on the protection of birds,* from which a few extracts may be profitably quoted. "In an editorial on 'The Destruction of Small Birds,' published a short time since (March 6, 1884), occurs the following: 'We know, for example, of one dealer * * * who, during a three months' trip to the coast of South Carolina last spring, prepared no less than 11,018 bird skins. A considerable number of the birds killed were, of course, too much mutilated for preparation, so that the total number of the slain would be much greater than the number given. The person referred to states that he handles, on an average, 30,000 skins per annum, of which the greater part are cut up for millinery purposes.' The same article in referring to the destruction of birds for millinery purposes on Long Island, states that during the short period of four months 70,000 were supplied to the New York dealers from a single village. An enterprising woman from New York has contracted with a Paris millinery firm to deliver during the summer 40,000 or more skins of birds at 40c apiece. With several taxidermists she is carrying out the contract, having engaged young and old to kill birds of different kinds, and paying them ten cents for each specimen not too much mutilated for millinery purposes. The same havoc has been wrought with the egrets and herons along our Southern shores, the statistics of which, could they be presented, would be of startling magnitude. We only know that colonies numbering hundreds, and even thousands, of pairs, have been simply annihilated—wholly wiped out of existence—in supplying the exhaustless demand for egret plumes. The heronries of Florida

*Destruction of Our Native Birds, Bull. No. 1, Committee on Protection of Birds, American Ornithologists Union, Science, supplement, 1886.

suffered first and most severely; later the slaughter was extended to other portions of the Gulf coast. As an instance of the scale on which these operations are carried, it may be mentioned that one of our well-known ornithologists, while on an exploring tour in Texas, heard an agent of the millinery trade soliciting a sportsman to procure for him the plumes of 10,000 white egrets. Advertisements in newspapers, by milliners, of the stock in hand, also give some suggestions of the traffic in wings and bird skins, it being not uncommon to see thousands of wings (plain or fancy, in natural colors or dyed), as well as thousands of bird skins (mounted or made up), and thousands of plumes (dyed or plain), advertised by a single dealer, while the dealers themselves number hundreds, if not thousands, in each of our larger cities. Add to these the smaller shops, in country and city, throughout the land, and we get at least some comprehension of the extent of the traffic in birds by the milliners, and the support they receive from the feminine portion of our population. Respecting the traffic abroad, we learn from an English authority that there were sold in one auction store in London, during the four months ending April, 1835, 404,464 West Indian and Brazilian bird skins, and 356,389 East Indian, besides thousands of Impeyan pheasants and birds of paradise. In this country of 50,000,000 inhabitants [you will recall that I am quoting from the report of 1886], half, or 25,000,000, may be said to belong to what someone has forcibly termed the 'dead-bird wearing gender,' of whom at least 10,000,000 are not only of the bird-wearing age, but—judging from what we see on our streets, in public assemblies and public conveyances—also of bird-wearing proclivities. But let us say that these 10,000,000 bird-wearers have but a single bird each, that these birds may be 'made over' so as to do service for more than a single season, and still what an annual sacrifice of bird life is entailed! Can it be placed at less than 5,000,000?—ten times more than the number of specimens extant in all our scientific collections, private and public together, and probably a thousand times greater than the annual destruction of birds (including also eggs) for scientific purposes."

The report of this committee, of which I give only a few extracts presents a terrible tale of havoc. The birds are desired by the milliners when they are brightest colored, that is during the breeding season, and they are then shot while the young are left

to starve in the nests. The aigrettes, so much prized by women, are the thread-like plumes or scapulars of various egrets and herons which the birds wear for only a few weeks; in the midst of the nesting colony the old birds are shot down, these plumes plucked out, then the remainder of the bodies thrown away. Of smaller birds, often only the wings and tails are used. In France swallows have been caught in large numbers by means of fish-hooks baited with live insects, the birds dying in torture, in order that their skins may adorn hats.

Though these statistics are appalling enough, such figures are very difficult to procure, because the milliners decline to furnish them; but unquestionably far more birds are killed for dress than are represented in the numbers we have quoted. When these facts were first made known, women became horror-stricken, and the destruction fell considerably in amount. But the horror seems to have passed away to great extent, or else the younger feminine generation seem to be unlearned in these matters, because, whenever the edict goes forth from Paris or Vienna that birds be worn, they are being worn almost as numerous as ever before. A more heartless and thoughtless slaughter could not well be devised.

C. MEANS OF PROTECTION OF BIRDS.

It is the well-founded opinion of both sportsmen and naturalists, those most competent to judge, that our native birds are all of them decreasing in number with ominous rapidity. It is also the decision of all who have specially studied the matter that such extermination should be prevented on account of the important practical importance of birds to agriculture. If this killing is allowed to proceed at its present rate, within a relatively short period all the native birds will be gone from the more cultivated districts, and only in the more inaccessible localities can they continue to survive—a loss that will be to the immediate detriment of the farmer. This is in no way a hasty conclusion, it is an obvious inference from the plain facts of the case. It is much the same question with regard to birds as with the forests: the latter must be replanted as they are cut down if we would save our wood, preserve our water supply and prevent disastrous floods; the birds must be protected if we would save our crops and pastures. And, as in so many other matters, a stitch in time saves nine.

This leads us to examine into the more efficacious methods of protecting birds.

In the very first place, there must be a spread of accurate knowledge concerning the practical value of the birds, and especially among the farmers. The average farmer has come by the idea, and has scarcely modified it, that the majority of birds work a direct injury to him, and that all in his fields and orchards should be shot. Because the farmers compose the most numerous class, information given to them will insure the best results. The National Department of Agriculture and the various State Boards are at great expense, and under the direction of skilled naturalists, publishing and distributing circulars; but the drawback is that farmers are slow to pay attention to these sources of information, or are skeptical as to their accuracy.

Yet once this conservative farmer-class can be brought to see the facts in the right light, and fortunately they are beginning to, two good results will surely follow: first, they themselves will cease to kill birds; and second, and this will have greater and more profound effects, they will keep others from shooting upon their lands. Some day, let us hope, the farmers will no more allow the killing of wild birds than they will allow the killing of their poultry by others. The great difficulty in enforcing laws for protection is the lack of game wardens, but each farmer would gladly constitute himself a protector of birds when he is brought to see that is for his own best interests; and the greater extent of our continent is inhabited by farmers. Common-sense talks before farmers' granges and before the meetings of ranchmen, may prove more efficacious than printed matter. In regard to the bulletins on the subject written by experts, it should be seen to that these really reach the farmers for whom they are intended, instead of being consigned to the waste-paper baskets of congressmen. Indeed, our legislators could give very important aid by the wise distribution of such matter, were they only better acquainted with the urgency of the situation.

In the second place, the boys of the country should be reached by both persuasion and coercion. One of the best methods of accomplishing this has been found to be the presentation of nature study courses in the primary schools, courses that directly awaken the children's interest in the bird life around them. The success depends to large extent upon the teacher's enthusiasm and ear-

nestness in the matter. Instead of shooting birds and robbing nests, the boys may be readily led to organize bird societies and learn to protect them from the interest they find in their habits, care of the young, and migrations. Boys always show an interest in the periodical movements of birds, and are easily influenced to keep records of observations on the times of the arrivals and departures of migrants; teach them such interesting sides of the question, as well as the cruelty of bird killing. Get one influential boy interested in the subject, and he will quickly see to it that in his community nest-robbing ceases.

As in all education, so here, too, the greater part should lie with the parents. The numerous Nature Study books now being published are often very inaccurate and fanciful; most of them are fairy stories rather than natural histories; but they are doing the general reading public much good in teaching respect for birds and a feeling of friendship for them, and this is a great point gained. Before long, let us hope, educated parents will purchase note books for their sons rather than guns.

It would be chimerical in the face of the common sentiment in the matter to attempt to abolish shooting for sport; hunting is an instinct too deeply implanted within us. But the number of birds to be classed as game should be narrowly limited, and here should be reckoned only the swans, ducks, geese, rails and coots, snipe, sandpipers, plover, grouse, quail, partridge and turkey. The wild pigeons or doves should never be classed as game birds, they should be rigorously protected on account of their invaluable services as weed destroyers; and the field larks and bob-whites (quail) should be taken off the game list in agricultural communities. The open season for all should be short, as far as possible uniform in the different States, and above all there should be no open season in the spring and summer when the birds are returning to their nesting grounds to reproduce the individuals of the next generation. One is unwise to kill the bird that lays the golden eggs. The game-hog must be denounced and downed, and to accomplish this a mode in use for the protection of game fish should be employed: that is, the breach of the game law being punishable by fines, to pay the amount of the fine to the informer. Members of shooting clubs would do well to make it a condition of membership, that every member should report to the proper authorities any breach of a game law; done in this

way it would become a righteous act and no odium would attach to the informer. Laws for the more rigid protection of game work no injustice; they are, on the contrary, of necessity in that they preserve the game from season to season. Every true sportsman acknowledges this, and the movement for the protection of birds started in this country in the columns of a sporting paper, the "Forest and Stream." If one would have good shooting from year to year one must simply limit the size of the game bag, and see that others do the same; and the more the human population increases, the greater the number of sportsmen becomes, the shorter should become the open season for game.

But for market shooting there should be no open season. We no longer rely upon wild animals for our food, and the variety of cattle and poultry raised for the purpose gives us a sufficient variety of meats without the need of sales of game in the markets. It is well known that market gunners make only a poor living, so that to deprive them of their occupation would not be a hardship to them, for it would compel them to undertake a more lucrative employment. The best method of combatting market shooting is by the prevention, by the Lacey Act, of the shipping of game from State to State, and from county to county.

Most of the States have game laws, and a considerable number, including Texas, have also adopted the model game law protecting also non-game birds. But a law is powerful only in so far as it can be enforced, and over the greater part of our land there are no game wardens. We have already pointed out how the farmers may be instituted our most efficient game wardens. A primary principle in such laws is the recognition that birds are not the property of the individual but of the State, because they are free gifts of Nature. But perhaps it would be more correct to class them, as the rivers, as National rather than State property; and for the reason that most of our native birds are migratory in habit, nesting to be sure in particular localities, but in the Fall and Spring passing along the continent. Such birds are therefore denizens of the whole extent of country that they traverse, consequently national. This principle is fully recognized in Great Britain, where a man may not shoot on his own preserve out of season. A national system of game laws would be for the best interests of the sportsmen, and its framing could be safely

entrusted to the Biological Survey of the Department of Agriculture.

Everywhere our public libraries could give important help in the matter of protection, by placing accessibly upon their shelves that admirable magazine "Bird-Lore," now the official organ of the Audubon Society, the better of the Nature Study books, and the reports of the Biological Survey and the Audubon Society.

Then the wearing of the plumage of wild birds must be stopped. It has been found that it cannot be done in moderation, therefore it must be prohibited altogether. It will not do to prohibit the killing of our American birds and to allow the importation of foreign ones, for this would be injuring another country, and in the long run, for the sake of greater cheapness, would result in the killing of our native species. The consumer's taste decides what the market shall be, and milliners offer feathers for sale only when there is a demand for them. It is a hard task to try to change the tastes of those women that follow the dictates of fashion regardless of consequences. But an appeal to thoughtful and sensitive women must accomplish good, when it insists upon the tremendous loss of life and suffering entailed. It should be taught to each uprising generation, for the daughters seem to forget what the mothers learned. Nature Study courses for the girls as well as for the boys can do much good. The wearing of ostrich feathers is of course allowable. But the wearing of chicken feathers is not to be encouraged, because the milliner has found it cheaper to secure the bright plumage of a wild bird than to dye the feathers of fowls.

Then the English sparrow is to be killed on all possible occasions for the injury it does to the grain crops as well as for its attacks upon native birds. Had we them out of our towns our trees would be filled with native songsters.. Every sparrow is not an English sparrow, however, and in killing the latter one should have sufficient acquaintance with the beneficial wild sparrows to avoid destroying them. A systematic destruction of nests of the English sparrow has been shown to give the most lasting results.

These are a few suggestions on the means of protection that seem to offer the best outcome. It is not an easy thing to accomplish and a long campaign must be made against ignorance and thoughtlessness. First and foremost the interest of the farmers

must be gained, and their services enlisted. Second, the school children must be reached. For success there must be organized movement, especially hearty and vigorous co-operation with the main organizations already in existence. The principal ones are the Biological Survey at Washington, always ready to furnish information and give assistance; and the National Association of Audubon Societies, with its offices at 525 Manhattan Ave., New York city, which is at the head of the hundreds of Audubon Societies scattered throughout the country. It is a movement that does not call for much expense but rather the application of good common sense.

D. LITERATURE.

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