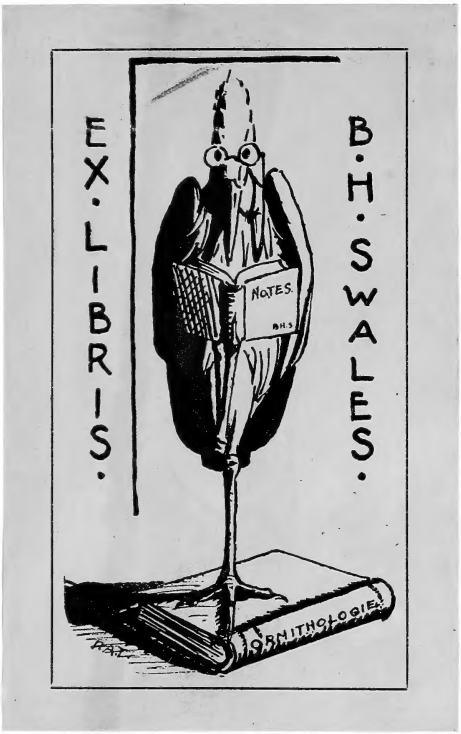
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WORLD'S CONGRESS ON ORNITHOLOGY

Elliott Coues,
Nov. 22d, 1896.

PAPERS

PRESENTED TO THE

WORLD'S CONGRESS

ON

ORNITHOLOGY

EDITED BY
MRS. E. IRENE ROOD
CHAIRMAN WOMAN'S COMMITTEE OF THE CONGRESS

UNDER THE DIRECTION OF
DR. ELLIOTT COUES
President of the Congress, Ex-President of the American Ornithologists' Union.

"Birds must and shall be protected."

CHICAGO
CHARLES H. SERGEL COMPANY
1896

CONTENTS.

WORLD'S CONGRESS AUXILIARY

OF THE

WORLD'S COLUMBIAN EXPOSITION OF 1893.

DIVISION OF ORNITHOLOGY.

ANNOUNCEMENT OF THE COMMITTEE IN CHARGE OF THE CONGRESS ON ORNITHOLOGY.

THE undersigned Committee, having been appointed by the proper authorities, announce to all interested persons that a Congress on Birds will be held in Chicago, during the month of October, under the auspices of the World's Congress Auxiliary.

It is the design of the Committee to have the Congress treat of birds from the standpoints of the scientist, the economist, and the humanitarian.

The field, from the first point of view, belongs to the technical ornithologist; and it is the wish of the Committee to enlist the co-operation of scientists in the proposed Congress, in order that the study of birds may become more general and be appreciated at its true worth by the people. The scientist only can prove the value and interest of ornithology, and upon its proper appreciation does the importance of the two other divisions depend. The audiences

of the Congress will doubtless be largely composed of those who, through æsthetic feelings and humane sympathy, rather than intellectual apprehension, have been attracted to the subject, and they will prove a ready means of popularizing the science.

Under the head of aviculture, the economist will be given the best results and profitable advice of those who have paid special attention to cultivation of the birds which have proved useful, or otherwise practically interesting to man. The domestication of birds suitable for food, and the taming and training of song birds, are industries of growing value, to which may be added the proper protection of insectivorous birds, humane methods of limiting the increase of birds harmful to man, and legitimate means of securing specimens needed by scientists.

Upon the interest awakened by the proper presentation of these divisions of the subject will largely depend the success of the Congress.

There is need and possibility of securing legal protection for useful and beautiful birds against indiscriminate slaughter. It has been truly said that if all birds should be destroyed the human race would be unable to withstand the aggressions of injurious insects which would be the inevitable result. The ruthless and brutal slaughter of birds during the past few years is forcing the truth of such conclusions upon us. The connection is not remote between the destruction of birds and the recent alarming increase of insect life that has been so ruinous to fruit and grain.

The study of birds opens so wide a field of interest and importance that we feel justified in believing that this Congress will appeal successfully to thoughtful and inquiring minds.

The date assigned for this Congress is the during week beginning October 16th. Several sessions will be held, in Hall No. 23 of the Memorial Art Palace, at 2 P. M., on successive days to be determined hereafter. The interven-

ing time is so short that we hope all who are interested in the subject will attend without further notification, and will help us, by criticism, suggestion, or advice, to attain our object.

The Advisory Council of this Congress will be announced hereafter.

DR. ELLIOTT COUES, *President American Ornithologists' Union, Chairman,*

PROF. S. A. FORBES, *Vice-Chairman,*

REV. JENKIN LLOYD JONES, PROF. W. R. MITCHELL,
REV. GEORGE B. PRATT, REV. R. F. JOHONNOT,

General Committee of the World's Congress Auxiliary on an Ornithological Congress.

MRS. E. IRENE ROOD, *Chairman,*

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Woman's Committee of the World's Congress Auxiliary on an Ornithological Congress.

MEMORIAL ART PALACE,
CHICAGO, ILL., *Sept. 1st*, 1893.

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Younge, Charlotte M., Winchester, England.

PUBLISHER'S NOTE.

THE World's Congress on Ornithology was held in conformity with the announcement of the Committee, in Hall No. 23 of the Memorial Art Palace, at 2 P. M. of Wednesday, Thursday, Friday, and Saturday, Oct. 18th–21st, 1893. The few weeks intervening between the appointment of the Committee and the sessions of the Congress did not enable the Committee to do all they wished to mature their plans for the co-operation of ornithologists living at a distance from Chicago, but they had reason to be much gratified at the measure of success attained, as witnessed by the large and interested audiences which attended every session, and the many papers which were read in person or by proxy. In the unavoidable absence of President Coues the chair was occupied by other members of the Committee. The opening address was made by the late Rev. Dr. David Swing, who was followed by Rev. Jenkin Lloyd Jones, Prof. D. D. McCormick, and others. The programme prepared for the four sessions, and printed at the time, was carried out as far as possible, but some changes were necessitated by delay or non-reception of some papers which had been expected, and others were made for the convenience of those who presented papers in person. The papers selected for publication by the Committee include among those which were read before the Congress a number which reached their hands too late to be placed upon the programme of the sessions.

The responsible editor, Dr. Elliott Coues, has given personal supervision to every paper, and has read the proof of the entire book.

THE PRESIDENTIAL ADDRESS.

LADIES AND GENTLEMEN:

It is my pleasurable privilege to greet you with words of welcome on this auspicious occasion, and I am with you in spirit, though in person far from the scene of your gathering in the interest of that delightful pursuit to which many of the best years of my life have been devoted. I fondly hoped and fully intended to preside over your deliberations; but the fates willed otherwise, and imposed a seemingly capricious migration westward to the shores of the Pacific, at the time I would have remained in the city by the inland sea, could I have consulted my own desire. But distance debars me not from cherishing the wish to say a few words you may be glad to hear on the USE AND BEAUTY OF BIRDS.

Birds are not less useful than beautiful. It is said that beauty is its own excuse for being; it is said that a thing of beauty is a joy forever; it may be said that birds add to their other charms the beauty of utility. One use of beauty is to stimulate and gratify our æsthetic sense; perception of the beautiful is an end in itself, for it strengthens and develops some of our highest faculties, some of our finest feelings. One use of birds subserves this noble purpose; but other uses are theirs, of the sort to satisfy the most practical utilitarian, devoid though he be of all appreciation of abstract beauty. For I venture to assert, and hope to be able to show, that the degree of civilization which the human race has reached would have been difficult if not impossible without the assistance of our feathered friends.

As we all know, the natural man was a wild beast in the beginning, not a little lower than the angels, and not much

higher than an ape in the order of animated nature. He was also a carnivorous creature, hunted his prey in packs, and if he varied his diet of flesh it was only with wild fruits or roots. After awhile he learned the use of fire, and thus became a cook—that one thing which distinguishes man more prominently than anything else from every other animal. When he had acquired this art, he liked his meat better than he did before; this led to further reflections, and primitive man learned to pray—that is, to aspire, in the desire for further improvement of his lot, and seek means to that end. When man had become a cooking and a praying animal he was not far from discovering that two blades of grass could be made to grow where one had grown before. But to do this required much thought and work; he had to settle down to cultivate the ground successfully. The pursuits of the hunter are incompatible with the occupation of the farmer; and one of the greatest strides which any people have ever taken from savagery toward civilization is that during which a nomadic, predatory tribe is transformed into tillers of the soil with fixed habitations.

It is just at this turning-point in the development of human capacity for self-improvement that birds appear in a new light and take on new uses. To the wandering, hunting barbarian they were only objects of the chase, which he killed for food and clothing, as he did any other animal which could satisfy such primitive wants. He ate their flesh, and sucked their eggs, and sewed their skins to wear, and stuck their feathers in his hair to make himself look fine. Such barbarians are not all dead yet, nor of one sex only, nor confined to the tribes we call savage; they are still in evidence, in our own midst, of our most primitive ape-ancestry. But very early in the art of agriculture observant and reflective farmers found insidious foes which often brought to naught the sweat of their brows. What to his hunting progenitors had been known only as a trifling annoyance, in buzzing and biting or stinging, offset in some cases by the morsels of food

furnished by certain insects, became to the tiller of the soil an innumerable host of new enemies, a myriad plague. In fine, birds and insects both assumed new relations to the human race when agriculture began, and this relation was on the part of birds helpful, on the part of insects hurtful, with few exceptions in either case. Nay, more; the pristine farmer we have in mind had not only to contend with insects as they were when agriculture was first practised, but with increasing numbers to which tilling of the soil and cultivation of plants gave rise; for every farmer breeds insects which would not exist but for his labor, as surely as he raises stock upon his land. It also happens to be a fact in nature, that the bird-world and the insect-world are things apart, separate and antagonistic. Nearly all birds are insectivorous, to some extent, and very many birds eat nothing but insects. In their reciprocal relations, bird-life and insect-life offer one of the most remarkable systems of checks and balances to be observed in all nature; and with no natural order of things can man interfere with impunity. The damage done to agriculture by noxious insects is simply incalculable; no expert entomologist hesitates to place it at many millions of dollars a year, in our own or any other great country where farming is a national industry and a main source of wealth. This result is in spite of all the contrivances which the ingenuity of man has devised to hold insects in check; and all his efforts to that end are insignificant in comparison with the silent, ceaseless work done by birds in his behalf. It is not too much to say that successful agriculture would be impracticable without the help of birds; and I do not think more need be said, from the standpoint of sheer utilitarianism. The usefulness of birds as insecticides is measurable in money—and that is something everybody can understand.

Thus the birds are a great army, self-equipped, self-maintained and self-ordained, to wage war on a grand scale against our national foes, their natural prey. Yet this is not the whole of their good work. They campaign against many

other enemies of our race, take the field in various other directions, and keep up what I may call guerilla raids, incessantly operative on the part of certain members of the feathered legions against hordes of injurious animals whose damage to the crops is in the aggregate only less than that wrought by insects. Such are the small rodents, which live entirely upon grass and grain, and whose sharp front teeth chisel the farmer out of no inconsiderable part of his cereal crops, besides nipping in the bud or root the vegetables of the gardener, and girdling the young trees of the orchardist. The dashing guerillas who fight against these enemies of ours are the birds of prey, the Hawks and Owls, a large proportion of which subsist mainly on mice and other small mammals, seldom varying this diet except with the insects they eat in common with most other birds. People are peculiarly blind to the good offices of the rapacious birds —a most useful class, whose occasional raids on the poultry-yard, even the habitual killing of small insectivorous birds by some Hawks, is no offset to the good they do us in destroying noxious mammals. Instead of setting a price upon their heads, to promote their extinction, we should hold their lives priceless. This is a particular instance of the general case, that no natural balance of power in the animal world can be by man disturbed with impunity.

Insect pests and mammal plagues—these are the two great classes of the husbandman's foes which birds are appointed to hold in check. There are still some other ways in which the feathered tribes show themselves the friends of man. Some countries are infested with venomous reptiles, so numerous and so deadly that the mortality resulting from their poisonous bites forms an item in the census, and the best means of destroying them engages the attention of governmental officials. In all such countries there are rapacious birds which in the aggregate probably devour more noxious reptiles than are destroyed by the best directed efforts of man.

Yet once again : the lowly and indelicate yet most necessary office of scavenger is filled in all warm climates by certain birds of the Vulture tribe which live mainly upon carrion. These are unsightly and unclean, in the nature of the duties with which they are charged ; but theirs is a useful life, and they should be respected accordingly. They abate the nuisance of decaying carcasses and all manner of filth, in a belt of warm country which reaches from the cities of our sunny South past the tombs of the Egyptian Pharaohs to the Parsi Towers of Silence.

The foregoing are the good offices which birds volunteer to take upon themselves in our service. We have yet to consider the duty we impose upon them, as our direct tax upon them for our own revenue, whether of profit or pleasure. This is levied mainly upon birds which in domestication become poultry, and in the wild state are known as game-birds —a collective term which covers mainly the four orders of columbine, galline, limicoline, and anatine birds. The poultry-yard is recruited entirely from three of these groups ; but the limicoline birds, such as Woodcock, Snipe, Plover and their allies, are also objects of the sportsman's incessant pursuit. Now it so happens in the economy of nature, that all these birds, in what I have called their volunteer relations to man, are neutral or indifferent. They are not technically insectivorous, nor do they devour noxious insects to any considerable extent ; neither do they harm man in any marked manner. But their utility to him is enormous, in furnishing him food-products, both in the flesh and in the egg, besides other important commodities in the feather, such as pens, beds, coverlets, pillows, and various elegant articles of apparel. I am of the opinion that we habitually underrate these sources of wealth ; few of us, in fact, are sufficiently informed in the premises to come to reliable conclusions, though we eat poultry, game and eggs every day. I have seen a statement for which I cannot vouch, though it seems to me credible, that the total output of the poultry industry, in the

shape of hen's eggs alone, exceeds annually that of all the mines of gold, silver, and other precious metals; but whatever the actual statistics may be, the food and feather sources of revenue are certainly enormous, and few industries yield greater profit for the comparatively small capital required. No one denies or even questions man's right to convert the animal world to his own uses; he may slay and eat, and in all ways command the life or death of creatures lower than himself in the scale of organization; he has always and will always do so, everywhere; his sovereignty in this regard is undisputed and indisputable. And thus it is that birds which of their own nature and volition are neutral or indifferent in the service of man, are forced into human relations of the most eminent practical utility, alike during their innocent lives and in their victimized deaths.

Lest I appear as only a partisan of birds, or a special pleader in a case I may seem to have prejudged, let us hear the other side, and see what counter-arguments or even indictments can be brought to bear against the objects of our present solicitude. Let us keep upon the same plane of practical utility, measurable in money, and attempt some estimate of damage done by certain birds, confining attention also to our own country, with which we are naturally most concerned. We have seen birds as our wholesale creditors; can the account be balanced in any items with which they must be debited?

Several such items are readily scored against birds. In the first place, some birds which are neutral in direct account with man become his enemies by their destruction of other birds which are useful to him. A part of the birds of prey are thus hurtful, not so much by their raids on poultry as by their destruction of insectivorous birds. Such rapacious species, in this country, belong especially to the genera *Falco* and *Accipiter*, the members of which eat relatively few insects, and do not destroy very many small mammals or reptiles, but are active and effectual in their sanguinary

attacks upon defenceless feathered tribes. A few of the very largest raptorial birds, by which I mean Eagles, commit occasional depredations upon weaklings of the shepherd's or herdsman's care; though as a rule the prey of these imposing birds is by no means commensurate with that prowess they are popularly supposed to possess, being in fact of very humble sort. It is practically difficult if not impossible to make the average American citizen draw distinctions with a difference in this case of raptorial birds. The agriculturists, and most sportsmen, may know a Hawk from a handsaw or a pitchfork, possibly a Hawk from a hernsaw or Heron, but do not know a Hawk from any other Hawk except that big ones are Hen-hawks or Chicken-hawks, and little ones are Pigeon-hawks or Sparrow-hawks; while Owls are all one Owl for such persons. I also suspect that few legislators know that Hawks with toothed beaks, and those with long fan-shaped tails and short rounded wings, are the ones chiefly destructive to insectivorous birds, all other kinds being largely or chiefly destructive to noxious small mammals. The upshot of the matter is, that the order *Raptores*, taken as a whole, is vastly more beneficial than injurious to man's interests; and the practical compromise in the case should be, that all birds of prey should be protected by law in all our states and territories, at all seasons of the year.

It is not probable that our useful insectivorous birds find their worst feathered enemies in the raptorial order, even in the genera *Falco* and *Accipiter*. That specious, unprincipled, and irrepressible libertine, so fair to see, like many a human rake—the Blue Jay, and every riotous robber of the tribe to which *Cyanocitta cristata* belongs, are indictable at criminal law for the mischief they make among peaceable songsters, by breaking up happy homes and sucking eggs. The whole family *Corvidæ*, in fact, have deservedly a bad name in this regard. They are insectivorous, to some extent, but best described, in respect of their regimen, as omnivorous; nothing eatable comes amiss with them, and all Ravens, Crows, Pies

and Jays are such enemies of better-behaved birds, that one may look unmoved upon their sable plumes or sky-blue wings, even on a woman's hat. The Shrikes (*Laniidæ*) are also cruel butchers of small song birds; but they are so largely insectivorous that in striking a balance of their good and evil deeds the account would probably be squared. The Cowbird (*Molothrus ater*) is a peculiarly insidious foe to many of our most useful insect-eating song birds. The old-world Sparrow (*Passer domesticus*), which we fatuously imported a few years ago, for expected services as an alleged insecticide, though fitted for that rôle neither by nature nor by art, is another enemy, by no means insidious, but offensively aggressive, obtrusively turbulent, ubiquitously noisy, dirty, and a nuisance—the only instance of total depravity in the bird-world, the only sinner beyond hope of redemption, the only outlaw upon whose scalp our lawmakers should set a price. Millions of dollars would not pay for the damage annually done by the Sparrow, both directly, in destruction of crops, and indirectly, by interfering with the good offices of insectivorous native birds.

The foregoing are the chief if not the only cases which we find on the wrong side of the ledger in consequence of harm done to distinctively useful birds, and thus indirectly to man. Let us look at some exemplary damages we may seek to recover for our direct injuries.

Among birds which feed upon cereals, and therefore destroy crops to a greater or lesser extent, are the related families *Corvidæ* and *Icteridæ*. In the former, the Crow is the most conspicuous—that much-abused bird, whose case has so long been in litigation—that astute, many-sided, alternately lustrous and shady character, whose activities have given us a household word—"scarecrow." The brief in this case would seem to be this: the Crow is as omnivorous as any bird can be; he is equally insectivorous and granivorous; he does at least as much good as harm; the verdict is "not proven;" he may be given the benefit of the doubt, and

allowed to go scot free. It is a much more serious question of the *Icteridæ;* for in this, the American Blackbird family, we find direct and obvious injury to crops a consequence of the vast numbers of some species, their gregarious habits, and their fondness for cereals in late summer and early autumn, when their appetites for corn and rice are whetted sharpest. The chief offender is the Bobolink (*Dolichonyx oryzivorus*), when, in the yellowish garb of the Reedbird or Ricebird, in the fall, this multitudinous destroyer descends by millions upon the rice-fields of the Carolinas. The damage thus done is enormous; the solicitude of the rice-grower is lest he lose his whole crop in the milk, and all his energies must be directed against a devastation comparable to that wrought in some regions by the hateful grasshopper, the potato-bug, the grape phylloxera, and many another formidable insect pest. According to their respective numbers and opportunities, several species of Red-winged Blackbirds and Crow Blackbirds or Grackles, belonging to the genera *Agelæus* and *Quiscalus*, are similar offenders; and it is not probable that all the insects they devour in the spring, or whilst rearing their broods in summer, amount to any considerable rebate of the loss they inflict upon the farmer by actual consumption of his crops. It is fortunate for him that in many localities the wild rice, *Zizania aquatica*, is abundant enough to feed a few millions of his hungry tax-collectors. If any birds should be excluded from the benefit of protective legislation, certain species of *Icteridæ* would be among the number.

We hear much of damage done to various fruits of the orchard and garden by certain birds. The damage is actual and not overrated. In some places grapes, cherries, currants, and other small fruits require to be protected by netting, or few would be spared. This is a particular class of cases which needs to be considered on its own merits, and almost every different region introduces some particular factor, less applicable or inapplicable in some other region, under some other circumstances. Take the Robin, for example. This

well-known bird is as fond of fruit as we are, as good a judge of fruit, and has no more scruples than the average schoolboy about stealing it. Yet the Robin (*Merula migratoria*) belongs to a thoroughly insectivorous family (*Turdidæ*), and is on the whole one of our most useful birds. The quantity of noxious insects consumed by every nestful of young Robins that ever was hatched is out of all proportion to the amount of fruit destroyed. The Robin is a public benefactor, and exacts but a small fee or reward for his valuable services. This is a type of the class of cases here in question; and since throughout this class, the little injury done is trifling in comparison with the great benefit conferred, all such birds should be fully protected by law.

Thus far in my remarks, I have written without a trace of sentiment, without any insistence upon humane considerations, solely from the standpoint of enlightened selfishness. Here the case might rest as a strong appeal to the most mercenary motives for the preservation of birds from needless, wanton, and misdirected destruction. Nearly all birds require our protection, for the good of our pockets, in a matter of dollars and cents. We need more bird laws, and better ones, more adequate to the emergency and more rigidly enforced, for our own protection, to say nothing of what right to life, liberty, and happiness we may choose to concede to birds, or elect to withhold from them. Such laws as we have are inadequate, only exceptionally enforced, and mainly concern open or close seasons in which certain game birds may or may not be killed. Some of our statutes are not only fatuous or fatally defective, but also positively pernicious. Witness that Pennsylvania law which offered a premium on the destruction of Hawks and Owls, and was only repealed when rodents overran the state in the most legitimate manner. This was like that California statute to promote the extermination of coyotes, which resulted in such a plague of rabbits that the destruction of these long-legged rodents required active and concerted public measures. It

cannot be repeated too often, or be too strenuously insisted, that interference with the established checks and balances of nature is always unwise, generally dangerous, and not seldom disastrous. It was done when rabbits were introduced in Australia, where they have become a national nuisance. It was done when we introduced the Sparrow—upon the misguided, ignorant representations of such a man as the late Dr. Thomas M. Brewer, against my vigorous and even vehement protestations. The result of placing this sturdy, turbulent, and fecund foreigner under conditions of environment favorable to limitless multiplication, is before you in the shape of an ineradicable pest, beyond the reach of any law that could be devised, and against which we might as well invoke the thunders of the Vatican in hopes of scaring the Sparrow away. But in all, or nearly all, other cases, wise, sound, strong laws could and should be enacted by the legislature of every State and Territory in the Union, to regulate relations between feathered and featherless bipeds, for the benefit of each party to the transaction. Such laws, all agreeing in the spirit of enlightened selfishness, perhaps also colored with humane sentiment, would differ in the letter according to locality; and such difference as there should be, to provide for varying geographical factors in the problem, should be based upon expert ornithological opinion. Such scientific testimony being given due weight, regarding proper open and close seasons for game birds, regarding species which it shall be unlawful to kill at any season, regarding species which may be killed at all times, or whose killing may be encouraged by proper provisions, the required laws cannot be made too stringently sweeping or too rigorously enforced by suitable penalties for their infraction, and requisite means of bringing offenders to justice.

If any such legislation as I advocate be deemed advisable upon the utilitarian and even sordid considerations thus far advanced, how much more imperative will not the full requirements of this case appear, if we turn from any such

utility of birds as money can measure to some of the higher and nobler uses which birds subserve to man. Among these may be named the culture of the intellect. I speak now of the study of birds from a scientific standpoint—in a word, of ornithology. It is quite true that every page of the text-book of nature is educational. The most simple and lowly class of creatures, alike with those most complex and exalted in the scale of organization, may serve as objects of interested attention which train our powers of observation, as food for thought and reflection which nourishes and develops the mental faculties, as proper pabulum for intellectual growth. But it certainly seems to me that there is no fairer page in the whole book, none more open to the student of nature, none more legible to the lover of nature who can bring average abilities to bear upon it, than that on which is inscribed the life-history of a bird. Perhaps I am partial to that particular page, for my eyes first fell upon it when I was very young and plastic, and have never since that time been wholly withdrawn. But if so, it is a pardonable partiality, and one, moreover, with which the members of this Congress are in full sympathy. The first bird that ever arrested my attention, to the best of my recollection, was a scarlet tanager, which flashed through the green foliage like a vision, and vanished. This was a revelation to a child; my senses seemed rapt, as if by a visitation from another sphere of wondrous, unspeakable beauty. The fiery trail of a meteor could not have left a more indelible impression than my mind received at that instant. I verily believe the sight of that tanager determined to some extent the particular bent of my mind for ornithology rather than for any other branch of natural history, and to an equal extent has colored my mind from that day to this. So far am I from regretting this, that I think the best mental training I have ever had, be it in the exercise of powers of observation, or in the correlated growth of capacity for ratiocination, has been in the study of birds, whether in the field or in the closet; and certainly

some of the keenest enjoyments of which my nature has proven capable, some of the most lasting pleasures which life has had to offer me, have been derived from intellectual intimacy with feathered friends in their own world. When that tanager brought the message to me, I was not different from other children, except that I was rather more delicate than a perfectly healthy child should be, and therefore perhaps more impressionable than the average boy; but why should not many a boy take like pleasure in observing birds, and derive from them like lessons of life? The natural sciences, as they are called—though I know of no unnatural science—are more taught in our common and high schools than they used to be when I was on the benches; and there is certainly no one department of natural history to which young folks take more kindly, or for which the materials are more copious and accessible, than the study of birds. I wish for and hope to see the day when some knowledge of ornithology, in its rudiments at least, shall be taught in all our schools, as a matter of course.

I beg you to indulge my reminiscential mood a moment longer, for I wish to speak a little further on the utility of birds as objects of scientific study in the training of the intellect, and in so doing to draw further upon some personal experiences, to point a moral if not to adorn a tale. In my intercourse with birds as a student, sentiment has always been subordinated to science, and in the course of my career I have sacrificed many thousands of birds to slake my thirst for knowledge. Thus, though my nature is neither cruel nor wanton, though I have always shrunk instinctively from inflicting needless pain or taking life lightly, my walk among birds was for many years neither harmless nor merciful to these objects of my scientific scrutiny. I used to be a keen sportsman, and was a crack shot during the height of my activities as a collector of specimens. Yet I can truly say that I never killed for the pleasure of killing, never witnessed

the pain of a wounded bird without a twinge, and seldom wasted any material secured at the cost of a bird's life. I made it a rule to preserve the skins of all birds I shot, excepting such as I killed for the table, and I presume there are to this day few large museums of the world which do not contain some specimens of my handiwork as a taxidermist. I never thought, and do not now think, that there was anything wrong in this destruction of bird-life, great as it certainly was; it seemed necessary to proper and laudable ends; yet I should not like to do it all over again. Perhaps this is because there is no occasion for me to repeat my individual experiences, having learned what birds had to teach me at such a fearful cost to them; and certainly I should be the last to condemn in another the practices of which I have myself been guilty. This painful subject raises a large question, which each one must decide for himself, according to his own conscience. I am sure that no intimate knowledge of the science of ornithology can be had without killing birds for the purpose of examining their dead bodies; and if it be right to kill and eat to nourish our own bodies, it is not wrong to slay to slake our thirst for knowledge. This is a case in which the end seems to justify the means, and certainly it can make no difference to the bird that has been killed whether its poor body be eaten, or its skin be stuffed, or the whole be thrown away. The difference in this case would seem to be far more serious, for it affects a living human being, and not a dead bird. The moral quality of every human action resides in the motive, purpose and intention of the doer; if these be right, the result can hardly be wrong, though it may turn out to be a very sad necessity. If familiarity with suffering, through habitual infliction of pain and death, should result in callousness even, to say nothing of its possible ending in wanton cruelty from sheer love of inflicting pain, the person so affected becomes the victim of a moral degradation so profound, that it were far better he should never know anything

about birds than suffer such grievous evil to be brought upon his spiritual nature by their innocent instrumentality. The whole lesson he might otherwise have learned from them has been missed in that event, and one way in which birds may be useful to his finer feelings has been entirely lost, if he has perversely failed to be taught by these beautiful objects to be humane toward them, and feel a kindly, sympathetic sense of kinship with their bright and joyous lives.

I shall never forget the first bird I ever shot—a Chipping Sparrow, when I was about fourteen years old, when I first went into the woods with some other boys, one of whom had a gun, and seemed to me as big as a man in consequence, though I think now it was a gun quite as dangerous at the butt as at the muzzle. When it came my turn to shoot, I was so excited I could hardly hold the thing; I trembled all over, and my breath came short. But I took good aim, withstood the shock of the explosion, and ran with the other boys to pick up my poor little victim. As I handled the tiny gory body, limp and ruffled, and smelt the odor of hot blood mingled with the smoke of burnt gunpowder, a sort of frenzy seized me, which now seems little short of a devilish intoxication, and my dreams were feverish that night. Many years passed before the identical sensation recurred, from the same savor of gunpowder and blood, but it was human blood this time, spilled in the thick of an Indian massacre in Arizona, when I was a young army officer. I mention these two incidents, remote from each other in time and place, still further apart in relative gravity, yet having something absolutely in common, because each produced the same effect. I think this must be the very soul or spirit of wanton cruel killing; and if so, it is a very terrible thing, to be sedulously shunned as a thing wholly evil in its nature. I can conceive of few things more horrible than to be held fast under such a spell. Yet habitual indulgence of the propensity to kill brings about something even more injurious to the soul than any cruelty one can commit in a moment of

excitement, if it results in cold-blooded indifference to the taking of life and the infliction of pain. The climax of this horrible perversion of our better nature is probably reached only by some celebrated vivisectionist, to whom all possible torture is a tame and humdrum daily routine. But I do not think that any human knowledge is worth having at such an awful cost to a human being. I will not dwell upon such a subject; but I have brought up these considerations to show the perilous possibilities of the ornithologist's career. Some others may be less fortunate than I have been, those whose natures have something more akin to cruelty than mine has proven to possess; and I wish to warn all such of the risk they run, if their intellectual study of birds be not duly tempered with tender sentiments of mercy and loving kindness.

For if these qualities of the heart, which do the highest honor to our humanity, and tend to the truest development of our natures along the pleasant paths which our inmost consciousness points out as best for us to follow—if such heartfelt emotions are never stirred to lend their tender grace to the severities of intellectual achievements, cultivation of the æsthetic faculties during the pursuit of ornithology becomes impossible. It would be far better to let the birds alone than to misuse or abuse them. Beauty is theirs, in a thousand ways capable of ministering to man's exquisite delight; the utility of such beauty as theirs in unfolding his spiritual insight is not less, I dare say is even greater, than that more material usefulness upon which I have already dwelt; and if this greatest beauty of birds cannot be appreciated, at least it ought not to be desecrated. The mellowest pipe is played in vain to the deaf, to the blind the brightest play of color, the utmost gracefulness of motion, all perfection of form, are alike indifferent; but every one whose senses are alert, whose imagination is vivid, and whose intellect is balanced, will find in the world of birds a world of use and beauty.

ELLIOTT COUES.

THE MIGRATION OF BIRDS.

BY J. A. ALLEN.

American Museum of Natural History, New York.

THE migration of birds has long attracted popular attention, references to the subject dating back to the days of the prophet Jeremiah, who says: "Yea, the stork in the heaven knoweth her appointed times; and the turtle and the crane and the swallow observe the time of their coming." The early naturalists speculated upon the seasonal movements of birds; they noted the periodical appearance and disappearance of the 'birds of passage,' but had little knowledge as to where they went for their winter quarters. Certain European birds were even supposed to be annually transformed into other species for a portion of the year, or else to pass the season of winter in a state of hibernation at the bottom of streams or ponds. It was thought that the Cuckoo became changed into a Hawk in winter, and that Swifts, Swallows and Rails descended into the mud at the bottom of ponds at the approach of cold weather.

In later times the winter haunts of many species were gradually discovered, and the fact of their long flights of migration became well established. Yet the matter remained to a large degree involved in mystery; the migrations of birds were thought to be in a sense automatic, under the impulse and guidance of a blind, unerring "instinct"—in other words, little short of miraculous. During recent years the phenomena of migration have been made the subject of careful and systematic investigation by thousands of ob-

servers, often under the direction of committees of learned societies specially appointed for the purpose. The literature of the subject has rapidly increased, and each year sees the publication of elaborate reports giving in detail the movements of birds as observed in various countries, especially in Germany, Austria-Hungary, Italy, the British Islands, and the United States and Canada. Much new light has thus been thrown on the cause and the manner of migration, till now the general facts of the subject may be said to be well known.

The migration of birds evidently dates back to the close of the Tertiary, when great changes in the climatic conditions of the northern hemisphere began to prepare the way for the subsequent ice period which buried so large a part of the northern lands under a heavy ice-cap and reduced the present warm temperate latitudes to semi-arctic conditions. Birds, in common with other forms of life, were either forced to migrate or suffer extinction under the new condition. As previously a warm temperate or subtropical climate extended northward to Spitzbergen and Greenland, there was no occasion for birds to migrate, and subtropical birds, as well as subtropical plants, found a congenial home almost within the Arctic Circle. Later on the ice-cap melted; the area of habitable land increased; but the climatic conditions of the temperate latitudes had become transformed. Instead of a nearly uniform temperature throughout the year, a comparatively warm summer was followed by an icy winter; while a considerable area became opened up as a congenial summer home to a great multitude of birds, the severity of the winter climate forced them to retire to more southern haunts to pass the colder season.

We have here what seems a natural and reasonable explanation of the origin of migration, and as such it is now currently accepted by ornithologists. In this way, it is believed, the habit of migration not only originated but has become so firmly established as to be an irresistible heredi-

tary impulse, as inherent and mandatory as the "instinct" of reproduction. But why do birds migrate? In considering this question it must be borne in mind that there is everywhere a constant struggle for existence—that throughout nature the birth-rate is far above the possibilities of permanent increase. Hence, in the bird world, as elsewhere, every station affording favorable conditions for existence must be occupied; there can be no unutilized corners. Many birds are organized to subsist only upon either insects or soft fruits, or upon both combined; these abound in summer in regions far to the northward of where they are found in winter. Thus many of our Swifts, Swallows, Warblers and Flycatchers can range in summer to the very borders of the Arctic Circle, where for a few weeks they find an abundance of food and a congenial temperature. Here they nest and rear their young, but are forced to retire at the approach of autumn, retreating gradually before the southward advance of the cold wave, passing through the middle latitudes in September, and reaching the tropics in October or November, the time varying more or less according to the species. Here they remain till the increased warmth of March or April awakens the procreative impulse and admonishes them of the return of genial conditions further northward. Then they begin to retrace the journey toward their summer haunts, keeping pace so exactly with the advance of the season as not to lose even a day of the brief interval available for their sojourn in their semi-arctic home. They are thus wanderers for three-fourths of the year. Evidently our northern-breeding insectivorous and berry-eating birds could not survive a winter at their breeding grounds. They might perhaps live the whole year in the tropics, and possibly in the lower temperate latitudes—at the risk, however, of overcrowding the regular occupants, and of also leaving a habitable area unoccupied. As a matter of fact nature not only "abhors a vacuum," using the phrase in a strict sense, but allows no waste places; living

space is always at a premium. Near kin of the Warblers, Swallows and Flycatchers which visit the subarctic and cold temperate districts are found in the tropics and throughout the warmer temperate latitudes; while the tropical forms are non-migratory, those breeding in the temperate latitudes are less so than their more northern relatives; they remain, owing to the longer summer, a much longer period at their breeding stations and have a shorter journey to reach their winter quarters.

This may serve as a general illustration, showing that the absence of proper food in the high north forces the summer insectivorous birds to leave these regions for warmer latitudes, where a perpetual summer insures at all times the supply of food their peculiar organization renders necessary. In short, as our knowledge of the habits and migrations of birds increases it becomes more and more evident that the cause of the autumnal migration is failure of proper food at the bird's breeding stations, the breeding habitat being also the bird's true home. Elsewhere it is an exile and a wanderer, most of the interval between the breeding seasons being spent in leisurely journeying to and from its breeding station and its winter haunts.

In many instances birds remain at comparatively northern localities during the winter if, through some unusual circumstance, they find their favorite food abundant, even if the weather prove more than usually severe. This is often illustrated in the case of the Robin and several species of Warblers and Sparrows. Yet, the fact remains that, in the case of a great many insectivorous species which breed in the high north, failure to migrate would bring certain destruction, due to decrease of temperature. This is shown by the fact that not unfrequently many birds are destroyed on their northward migration in spring by encountering too great a fall of temperature in late, unseasonably severe spring storms.

Why migratory birds ever leave their winter quarters is

not so obvious, since in most instances it cannot be due to a failure of the food supply, nor to any absolute incompatibility of climate. We are forced then to conclude that it is due partly to a habit of such long standing that it has become irresistible, or in a certain sense a part of the bird's organism, but partly, and perhaps mainly, to the necessity of returning to a region to which it has become so thoroughly adapted as to be indispensable to its well-being during the season of procreation. The return to the breeding station in spring has often been attributed to "strong home-love." That this home-love exists is shown by the return of birds to the same locality—even to the same nesting-place—for many successive years, of which there is so much proof that it is commonly assumed to be the rule in most species. It is certainly beyond question that birds do not select their breeding haunts in any haphazard way, journeying north along a vague course and stopping to nest wherever the proper conditions of season and other surroundings happen to prove favorable. Hence the impulse that governs their spring movements has been often loosely termed the "home instinct."

As already shown, the impulse to migrate, or rather the habit of migration itself, must have originated ages ago, as the result of a profound change in the climatic conditions of the earth following the close of the Tertiary period, and that through the lapse of thousands of centuries the habit of migration has passed down from generation to generation till it has become hereditary—as much so as any other trait—as that of nest-building, for example, in respect to choice of materials and the peculiar architectural effects characteristic of different species; or of laying eggs with distinctive color-markings, etc.

The subject of migration has perhaps been rendered needlessly complicated by considering the vernal and autumnal movements separately, and trying to find a different and special cause for each. A complete cycle of migration consists necessarily of two movements—from the breeding sta-

tion to the winter quarters and then back again. As the one movement is thus necessarily the complement of the other it is hardly needful to seek for a separate cause for each, the two together constituting migration in a complete sense. The impulse to leave the breeding grounds may be prompted by a reduction of temperature and a failing food-supply; the impulse to return may be more intimately associated with the function of reproduction and the consequent necessity of returning for this purpose to the proper home of the species—to a region of peculiar conditions to which the species has for long ages been undergoing special adaptation. This is perhaps the best explanation we can give of the origin and causes of migration.

How birds find their way over the thousands of miles of land and sea that often separate their winter and summer homes has always been the subject of much speculation. Until recently this wonderful power has been attributed to "instinct." This is a way of saying that the matter is involved in mystery, but also implying a sort of supernatural power on the part of the migratory bird. As, however, the facts of migration have become year by year better known the subject has lost much of its former obscurity. It is now known that birds migrate mostly by night, and as a rule at great altitudes; their sense of vision being acute, they are thus able to discern for long distances the more prominent features of the landscape—the coast lines, the larger rivers, and the more prominent mountain chains, with which their principal routes are found in a measure to coincide. Furthermore, birds migrate in large numbers at the same time, those of different species becoming mingled and moving in loose straggling parties; in this way the individuals of a given species may be always within sight or hearing of other members of their own kin or of the general concourse; it being the habit of most birds while migrating to utter their peculiar call-notes at frequent intervals.

It is claimed by some observers that in the fall migration

the young birds of the year, which have never before made the journey, are the first of their species to move south, or, in other words, precede their parents. Others claim that some of the first birds to leave are always old birds, and that they act as guides to the inexperienced young birds. It is evident, however, that it matters little which view be correct, for in either case the young birds become mingled with the general throng bound on their southward journey and are not dependent on either their own resources or on other members of their own species for direction.

This implies, of course, strong memory on the part of the old birds, proof of which is not wanting in their ability to find their way back, spring after spring, to their accustomed nesting-places—not merely to the same general region, but to the same tree or cliff or other shelter to which the same pair of birds return year after year for many years. This being true—in proof of which there is much strong evidence—it is easy to believe that they can readily recall the general features of the country they may have to cross in their semi-annual wanderings.

Birds exercise more or less choice in respect to meteorological conditions in regulating their migratory journeys. They prefer fair weather, and do not generally attempt protracted flights during overcast or stormy weather. The direction and force of the wind seems a secondary consideration, but at times undoubtedly exerts considerable influence. Temperature, however, is the most important condition; a considerable decline hastening the migratory movement in autumn and greatly retarding it in spring, at which season, a severe and protracted period of cold weather may check the advance for days together. A warm wave in spring, on the other hand, greatly hastens the advance and gives rise to a coincident "wave of migration," so familiar to all field-observers, marked by a sudden and great increase in the number of birds, as regards both species and individuals, at a given point.

But these migratory journeys of the birds are replete with accidents due mainly to the elements. They are often caught by cyclonic storms while *en route* and blown hundreds and sometimes thousands of miles from their course, and not unfrequently out to sea, where they perish by thousands from exhaustion and drowning. Or they become confused by fogs or thick weather, and for the time being are lost. It is at such times that they flit about lightships and lighthouses, and are killed by flying against the bewildering lantern, which proves to them a beacon of destruction instead of a guide to safety. Not unfrequently they are destroyed in spring by unseasonable storms, they having been lured north by a warm wave, or a period of mild weather, only to encounter greater inclemency than they are able to withstand. Every few years, great loss of life from this cause overtakes many of the later migrants, as the Warblers, Swallows, Tanagers and Flycatchers. Instances are on record where a species, as the Purple Martin in Massachusetts many years ago, after having reached its breeding station has been wiped out of existence over a considerable region, causing a great scarcity of the species for years afterward over the area of destruction. In fact, in view of all the varied accidents and disasters birds are liable to encounter during migration it is almost a matter of surprise that the natural increase is sufficient to offset the annual loss.

SLAUGHTER OF THE INNOCENTS.

BY REV. LEANDER S. KEYSER.

MANY persons seem to be possessed of carnivorous, or at least semi-carnivorous, proclivities. They do not appear to be happy unless they can see blood flow. From the small boy with his air-rifle to the professional collector, they have an itch for killing. The other day I encountered several doughty lads who had just shot three Chipping Sparrows, and when I asked them why they had committed such a wanton crime against the bird creation, they became mute, unable to assign any reason whatever for their conduct; for, of course, like their fellow-slaughterers of larger growth, they did not like to admit that it was their natural depravity—otherwise, unnatural meanness—that prompted them. I am sometimes tempted to believe that the strongest argument for the theory of the evolution of the human family from lower animals, especially wolves, hyenas and other blood-thirsty creatures, is their propensity to pursue and kill.

Be that as it may, it still is man's business as a moral and rational being to overcome the carnal inclinations of his nature. He must set up a stout Captain Resistance in his soul, as Bunyan would have it, who shall guard well the portals against external foes, and quell any mutiny that may arise within the gates. It is not in place, perhaps, to deliver a moral lecture at this hour, but I may be permitted to say that it might be a good and necessary moral discipline for the man or boy who is tempted to shed innocent blood, stoutly to stay his hand.

That thousands of innocent birds are slaughtered every year for no sufficient reason needs no asserting and brooks no denying. When will the "reign of terror" cease in bird-land? The sportsman's and collector's guns make the woods daily resound with sharp, echoing reports which must strike horror to many a birdling's heart; and with almost every crash of exploding powder a sweet, happy, guileless life goes out. One might almost be pardoned for repeating the Psalmist's despairing payer: "How long, O Lord, how long?"

That this wholesale and indiscriminate slaughter is extremely unwise, not to say suicidal, goes without saying. Should a man passing through a region infested with brigands turn upon his protectors and slay them, he would not do a more unwise deed than men do when they slay the birds, which are our natural guardians against myriads of biting, stinging, blighting and obnoxious insects. Why, in the economy of nature, these noisome insects were made, I need not stop to inquire, for this is not a speculative but a practical discussion. I must therefore let Sidney Lanier's dreamy inquiry respecting the sustenance of the Mocking-bird go unanswered:

> "Sweet Science, this large riddle read me plain:
> How may the death of that small insect be
> The life of yon trim Shakespeare on the tree?"

Being so extremely fond of feathered folk, I am half-disposed to say that the insects were made for the birds, and as to the birds themselves, why, they are "their own excuse for being." Yet mayhap the entomologist would say, "that is an explanation that does not explain." Well, no matter. We know that many destructive insects do infest the land, and that, if permitted to live and thrive, they play sad havoc with our gardens, orchards and woodlands; and, besides, we are just as well aware that birds are the natural destroyers of these insects. Such are the facts, explain them as you will. I may rack my brain to discover why so

many weeds persist in growing in my garden, but my speculations ought not to prevent my making a vigorous use of the hoe, which is the effective exterminator of the growths of weeddom. The hearer may make his own application of the parable.

Go out to the woods on a spring or autumn day, and watch the armies of Warblers, Vireos, Flycatchers, Woodpeckers and other birds busily plying their vocation of insect-hunting, and it will soon dawn upon you that they must be the natural preservers of our forests. I verily believe that if, in some way, all birds could be kept out of our woodlands for two years in succession, when the third spring came, the trees, spite of the wooing of sun and rain and dew, would continue as gray and bare as when January snow-storms made dismal music through their leafless branches. The fecundity of the insect world is so great and their appetite for every green thing so ravenous that the earth would soon become a desert had not a natural check been provided. What can be more desolate than a tree stripped of its foliage by a troop of worms! In view of the usefulness of the birds I do not pity the slayer of them if he is stung and pestered half to death by gnats and mosquitoes when he prowls through the woods on his godless errand.

It would be impossible to estimate arithmetically the service rendered by these winged scavengers of our woodlands and fields.

One spring day I witnessed the performance of a dainty Hooded Warbler (*Sylvania mitrata*) for over an hour. It was in a sparse woodland by an old gravel-bank. During that time he was scarcely still a moment. No sooner had he caught and disposed of one insect than he swung out gracefully on the air and captured another. If he averaged two insects a minute—and I think he did—he must have destroyed 120 in an hour; and if he worked only eight hours a day, he would have rid the woods of 960 insects more or less harmful to vegetation. Even if that should be twice too high an estimate per day, it must be remembered that the

little golden gourmand was only one of perhaps a thousand insect-eating birds in that timber tract. How many millions of injurious insects must be destroyed in a single season, all of which, if permitted to live, would prey on the vitals of vegetable life!

On a hot summer day I sat for an hour and a half on the top of a rail fence, watching a mother Dickcissel (*Spiza americana*) feeding her bantlings in the grass. The sun broiled, and I boiled—or, at least, my blood did. Still I kept my temper sweet, my interest in the little drama enacted before me lending a saccharine element, I doubt not. The little madam was kept very busy with her housewifely duties. Timing her with my watch, I found that she often flew away and returned to her brood with an insect in a half minute, sometimes in a quarter of a minute; she was seldom gone more than a whole minute, though once or twice an interval of two minutes elapsed. It is not to be supposed that she kept up such vigorous assiduity for a whole day, though why her nestlings required so much food at that particular time I do not know. Possibly it was meal-time with them. But if a bird should destroy even 400 insects during the 14 or 15 working hours of a summer day, in the months of May, June and July, it would rid the fields and woods of 36,800 insects—a service by no means to be despised. Nature has adapted these insects to the requirements of bird-life for reasons of her own, and hence has endowed them with a wonderful procreative power; and, therefore, man should be careful how he destroys this wisely established balance. Playing at see-saw with nature is always a dangerous pastime.

Even Hawks and Owls serve a useful purpose, and are rather man's friends than his foes, as has been conclusively proved in the report recently issued on these birds by the United States Department of Agriculture. Heretofore we have thought that Hawks and Owls ought to be slain indiscriminately. A Hawk was a Hawk, and his only use was to

make a target for the gunner. His only business was supposed to be to make excursions to the farmyard in search of billsome messes of domestic fowl. But this timely volume shows that not all Hawks are hawkish—at least, they do not all feed to any large extent on birds and poultry. It is true, the Sharp-shinned Hawk and Cooper's Hawk (*Accipiter velox* and *A. cooperi*) have a sweet tooth—or, rather, beak—for chicken and small birds of various species; but in the dissection of six stomachs of Harris' Hawk (*Parabuteo unicinctus harrisi*) not one fowl of any kind was found, but only parts of small mammals. The Red-tailed Hawk (*Buteo borealis*) is an exceedingly brisk, strong-winged bird; yet a carefully compiled table showing the contents of 562 stomachs demonstrates that these birds destroy a hundred times as many mice, moles and other harmful small mammals as birds and poultry.

The Red-shouldered Hawk (*Buteo lineatus*) makes himself still less obnoxious and still more useful, living chiefly on snakes, beetles, spiders, lizards and grasshoppers, as well as mice, shrews and moles. Swainson's Hawk (*Buteo swainsoni*) seems to avoid the farmyard entirely, finding locusts, grasshoppers, beetles, lizards, gophers and spermophiles more to his taste than domestic fowl. The same may be said of the Broad-winged, Rough-legged and Ferruginous Hawks. As to the Owls, it is simply astonishing what secrets are revealed by an examination of craws, showing that they are much more reputable birds than most people suppose. While some of them occasionally visit Farmer Gruffman's henroost, all of them find their diet chiefly in the fields and woods, where mice, chipmunks and snakes abound. We think every farmer and sportsman ought to study this useful volume, and learn to identify the various species of Hawks and Owls before he begins the war of extermination, so that he will not unwittingly massacre his friends instead of his foes.

The destruction of beautiful and innocent birds for fashion-

able ornament deserves nothing but castigation, and that in unmeasured terms. No apology can be made for such wanton cruelty. It is matter for great rejoicing that the wearing of birds on ladies' bonnets has almost gone out of vogue, and is scarcely considered good form to-day; at least, such is my impression, although I do not profess to be posted on fashionable modes and fads. My opinion is, however, that a brilliant-hued bird on a woman's bonnet would now be considered *boisterous*—which some of you may recognize as a synonym for "loud." That surely is an indication that the Millennium is coming, and we might already begin to sing, "All hail, the glorious morn!" without being guilty of an anachronism. A bird in the bush is worth forty on the head. It is apt to kill more troublesome insects. Between the man who shoots a beautiful bird and sells it to the fashion-monger, and the woman who wears it, the moral distance is infinitesimal.

There is another class of slayers of the innocents who deserve a word of rebuke. I may here be treading on delicate ground, and the technologist in bird-lore may take exceptions to some things I shall say. However, to get to the point at once, I refer to the professional collector—the man who massacres birds and burglarizes their nests for glimmering lucre; the clutcher who is forever clutching after "clutches." I may be accused of lacking the true scientific spirit, and of being a mere sentimentalist; but I retaliate, if you please, that a little more sentimentality, in the sense of tenderness of heart, would not hurt a good many of the naturalists of this and other countries. If science consists merely or chiefly in addition and multiplication tables, and never-ending catalogues of Latin names, then let us slay all the sweet creatures around us, and live on statistics instead of fruits and cereals. But I suspect that there is as much science in discovering a live bird's real character, learning his cunning ways, his likes and dislikes, as in classifying a dead bird's bones.

However, before I go farther, I desire to say that no one should object to the gathering of avian museums in colleges and large cities for purposes of scientific investigation and to assist the beginner in the task of identifying species. We have no quarrel with the true specialist, who has rendered valuable service to all lovers of birds and who is as merciful as he can be. But for the professional collector who pursues his calling to gratify the whims of private persons, mere curio-hunters, no excuse can be made. A collector in Canada sends me a long list of eggs and "clutches," and asks me if I do not want to buy. He doubtless has sent the same harrowing list to hundreds of other bird-lovers. He wants to dispose of his present stock, because he is soon going to the far north on an extensive collecting tour, and will doubtless return with many rare eggs, which he hopes to dispose of to good advantage. No! I do not want one of those eggs, for it would be nothing to me but a memento of man's inhumanity to birds. Every egg would tell me of a bird's heart sob. If this gentleman should make an expedition for the purpose of studying the habits of birds in the Arctic regions without killing them or robbing their nests, and then should publish his discoveries, I should be glad to buy his book. But his empty egg-shells—no, I want none of them. The ghosts of birds that might have been would haunt my dreams. If that is sentimentality, then I am a sentimentalist of the rankest ilk.

Is there anything so very valuable to science in extreme minutiæ? Must a hundred birds be ruthlessly slaughtered to find out whether there are a few inches of difference in their lengths from beak to tail, or from wing-tip to wing-tip? Is it an extraordinary contribution to science to be able to report that a typical clutch of the beautiful Prothonotary Warbler's eggs measured .72 x .57, .71 x .56, .70 x .58, .71 x .54, .70 x .59, and .72 x .58? How long will the collector himself remember those figures? Suppose he had studied the

dainty manners of the little feathered pair, and then spun a romance about them, or composed a poem, or even written a vivid descriptive sketch in plain prose, that would have been an addition to science indeed, as well as to literature. Let us have public museums, and perhaps at rare intervals a private collection might be permissible; but let us, as lovers of "our little brothers of the air," raise our voices in protest against slaughter and robbery for mere decorative purposes, or to gratify the momentary whims of gatherers of bric-a-brac.

It is difficult to understand how so many persons can take a charming bird's life without compunction. It is a sin against their æsthetic nature. See that Blackburnian or Chestnut-sided Warbler glancing about in the tree; now he balances atilt on a twig; now he clings back downward to a spray; now he poises like a hummer before a leaf cluster; now he flits and tilts from stem to stem so airily, so fairily, his varied colors flashing in the sun like the glittering facets of a diamond. He is a sonnet in feathers—lightness of air and sunshine embodied—rhythm caught in a living form!

THE RANGE OF THE CROSSBILLS IN THE OHIO VALLEY, WITH NOTES ON THEIR UNUSUAL OCCURRENCE IN SUMMER.

BY A. W. BUTLER, BROOKVILLE, IND.

In 1838 Dr. Jared P. Kirtland had not met with the American Crossbill (*Loxia curvirostra minor*) in Ohio or Indiana. Dr. R. Haymond omitted it from his "Birds of Southeastern Indiana" in 1856. Dr. J. M. Wheaton reported it from Ohio in the winter of 1859–60. Evidently it was quite well known to Dr. Haymond in 1869. The winter of 1868–69 they were very abundant in the vicinity of Cincinnati, according to Chas. Dury; this was doubtless the case at other places also. The range of the species, at this time, was supposed to be northern North America, south in the Appalachian mountains into Pennsylvania, and extending in winter irregularly over much of the United States. A letter from Mr. C. E. Aiken, of Salt Lake City, Utah, informs me that this species became very abundant in Chicago in July and August, 1869, and remained until late in the fall. They fed greedily upon seeds of sunflowers and were so sluggish that one could approach within a few feet of them, and they fell an easy prey to boys with catapults. In the latter part of August of the same year, he found them common in Lake County, Ind. He also notes that they were not rare the succeeding year in the vicinity of Chicago. Dr. F. W. Langdon notes the capture of a single specimen from a flock of six or eight at Madisonville, near Cincinnati, O., Nov. 30, 1874. In the winter of 1874–75 Mr. Eugene P.

Bicknell noted their presence in the Lower Hudson valley, and in April of the latter year found their nest. In the same article is noticed their occurrence about New York City in late spring and early summer, on Long Island in midsummer, and in the Bermudas from March to May (Bull. Nutt. Orn. Club, vol. v., pp. 7–11). Mr. E. W. Nelson, in his paper on "Birds of Northeastern Illinois," read before the Essex Institute, Dec. 4, 1876, says this Crossbill was "formerly a common winter resident; now rare." Messrs. Dury and Freeman (Jour. Cin. Soc. N. H., 1879, p. 4) note its occurrence at Westwood, O., in 1879. Dr. J. M. Wheaton (Bull. Nutt. Orn. Club, 1879, p. 62) gives the following account of the occurrence of the species in Ohio: "On the 18th of June last Mr. Charles Hinman killed one of these birds out of a flock of eight or ten which visited the coniferous trees in his garden in this city [Columbus]. The specimen which came into my possession by the kindness of Mr. Oliver Davie was a male, not in full plumage. I have since learned that the Red Crossbill has remained during the season in the vicinity of Cleveland in considerable numbers, and is reported to have nested there." In commenting on this note (Ohio Geol. Survey, vol. iv., Zoölogy and Botany, p. 317), Dr. Wheaton says: "I was unable to learn whether its nest had been actually discovered," and adds: "It has been known to nest in Indiana within a few years." I regret that I have been unable to get any clew to the authority upon which this statement is made. Prof. A. J. Cooke, in writing of the birds of Michigan, says of the American Crossbill: "Occasional in summer. Dr. H. A. Atkins took nests of this species at Locke, July 13, 1880." It had previously been reported as breeding in Minnesota. In July and August, 1880, they were noted at Rugby, Tenn. (Oologist, vol. v., p. 78; Bull. Nutt. Orn. Club, vol. vi., p. 56). Dr. C. H. Merriam notes it as an "abundant resident" in the Adirondack region. He says it is "rather scarce and irregular in summer, but the commonest bird in winter and

early spring. Breeds in February and March while the snow is still four or five feet deep on the level and the temperature below zero (Fahr.). Have taken fully fledged young in early April" (Bull. Nutt. Orn. Club. 1881, p. 229). Mr. C. W. Beckham ("Birds of Kelson County, Kentucky," Ky. Geol. Surv., p. 24) says: "A flock of six or eight of these birds appeared here on Nov. 18, 1882, in some pine trees, the first time I ever observed them. They remained only a day or two, and none were seen until the 17th of March following, when I shot eight out of a flock of about twenty in the same place where they had previously been seen. Several flocks were observed about the same time near Bloomfield and Glenville in this county, and excited considerable comment on account of their queer bills. The weather at the time was quite mild, so that their appearance here was probably due to some other cause."

The winter of 1882–3 they were unusually abundant in many localities between the Great Lakes and the Ohio River. Prof. B. W. Evermann first observed them at Bloomington, Ind., Feb. 10, 1893. This was the second record for the state. For some time after they were common in Monroe County. March 15, 1883, Mr. E. R. Quick reported having seen a single specimen near Brookville, Ind. April 2, my attention was attracted to a peculiar crackling sound which came from the pine trees in my yard at Brookville. Close investigation revealed the fact that the cause was a flock of Crossbills. They were shelling the seeds out of the pine cones, and the breaking of the cones made the sound which attracted my attention. I observed others were upon the ground feeding upon the seeds in the fallen cones. April 3, I saw six more in my yard. April 4, I saw one in a flock of Pine Finches. April 5, Mr. Quick noted one. Of those observed but one was in the red plumage. Prof. B. W. Evermann saw a few at Delpha, Carroll County, Ind., the middle of March, 1883. At the same place about twelve were seen December 26, 1884.

Mr. J. W. Byrkit informs me that they were very abundant at Michigan City, Ind., in the winter of 1883–4. Miss H. E. Colfax, in her report of birds noted at the lighthouse at the same place, gives them Jan. 16, 1884. In the winter of 1883–4, Prof. Evermann reported them very common in Monroe County, Ind. The Ornithologist and Oologist, vol. viii, p. 68, contains an account by A. H. Helme of their breeding April 10, 1883, near Miller's Place, L. I. Mr. Robert Ridgway (The Auk, I., p. 292) notes the probable breeding of the Red Crossbill in central Maryland, in May, 1884. Mr. F. C. Browne reported their breeding in eastern Massachusetts in the summer of 1884 (The Auk, II., p. 105). In the winter of 1884–5 they were tolerably common in Monroe County, Ind. (Blatchley; Hoosier Naturalist, 1886, p. 170). The late Mr. C. H. Bollman noted them quite common in the same county through March, April, and early May, 1885. He saw them first March 2, and last observed them May 12.

Mr. J. W. Byrkit informs me that he saw the first Crossbill for the year on March 24, 1885. He adds: "I am not quite positive, but think the Crossbills breed here, as they make their appearance about this time and leave for the north about the middle of May." Mr. Charles Dury informs me they were abundant at Michigan City, Ind., one winter, which he thinks was 1885. He also reported Pine Finches and Redpolls from the same locality the same year. Prof. E. B. Evermann reported it from Carroll County, Ind., March 27, 1885. I am indebted to Mr. E. M. Kindle for the information that Mr. Samuel Hunter reported a pair of Red Crossbills to have bred at Bloomington, Ind., in 1885. Mr. Hunter informed him that they nested in a pine tree and that the nest was made exclusively of pine burrs. Mr. R. R. Moffitt informs me that Red Crossbills were taken in Tippecanoe County, Ind., in 1885, and says they nested there. Prof. B. W. Evermann noted them at Camden, Ind., March 27, and April 13, 1885; also, a large flock at Burlington, Ind., April 23, 1885. Mr. William Brewster reported its

occurrence in the mountains of western North Carolina in the summer of 1885 (The Auk, III., p. 107), and says: "Seen only on the Black Mountains, where it was numerous in small flocks throughout the balsam forests above 5000 feet. At Highlands, I was told that it regularly appeared in winter about the outskirts of the town." Mr. Charles W. Richmond (The Auk, V., p. 22), gives, upon the authority of Mr. Hugh M. Smith, the information that an adult male Red Crossbill, accompanied by a young bird, was seen May 17, 1885, within the District of Columbia. Prof. L. L. Dyche reports the occurrence, in the winter of 1885–6, of the Western Red Crossbill (*Loxia curvirostra stricklandi*) at Lawrence, Emporia, Manhattan and Wakarusa, Kas. They were first observed Nov. 1, 1885, and were last seen Jan. 26, 1886 (The Auk, III., pp. 258–261). The following winter I was fortunate in securing, through the kindness of Mr. A. O. Garrett, a series of specimens of *Loxia curvirostra minor* from Lawrence, Kas. March 13 and 14, 1887, he obtained four, which he sent me; and later he sent me nine others which were taken March 24 and 25. The meeting of the range of the two forms is of considerable interest. Prof. B. W. Evermann reports a Crossbill, species not determined, from Bloomington, Ind., Feb. 23, 1886, and another March 8, 1886. The same authority states the late Mr. C. H. Bollman found a few specimens of the Red Crossbill near Bloomington, Ind., July 10, 13, and 14, 1886. Mr. Arthur B. Chadbourne says, in the summer of 1886 it was found in the White Mountains, N. H. (The Auk, IV., p. 105). Mr. George B. Sennett, in the same volume, p. 242, gives an account of finding this species in the mountains on the borders of North Carolina and Tennessee, in July and August, 1886. Mr. Arthur T. Wayne, in the same volume, pp. 287–289, notes their abundance near Yemassee, S. C., in November and December, 1886, and in January and February, 1887. He notes them again in the same vicinity, November 20, 1887 (The Auk, V., p. 115); also during January, 1888

(*Ibid.*, p. 208). Mr. Frank M. Chapman also reports them from Aiken, S. C., Nov. 12, 1887 (*Ibid.*, p. 324). Mr. G. G. Williamson observed them in Monroe County, Ind., Jan. 18 and Feb. 6, 1886. Mr. J. G. Parker reports them from Lake County, Ind., in May, 1887. In the fall of 1887, I again observed them at Brookville, Ind. They came to feed among the pines in my yard. Oct. 29, several were seen, and they last appeared Nov. 19. Prof. Walter Faxon and Dr. J. A. Allen give it as common in the White Mts., N. H., in July, 1874; June, 1885; and June, 1886 (The Auk, V., p. 152). Dr. Allen, on the next page of the same number of The Auk, speaks of a pair taken at Mandeville, La., March 27, 1888. Prof. B. W. Evermann found them in Vigo County, Ind., in the spring of 1888. They were first seen Feb. 6, and disappeared May 6. Mr. J. O. Snyder found them at Waterloo, Ind., March 13 and 17, 1888. Mr. H. N. McCoy informs me they were quite common in Wayne Co., Ind., in the early part of 1888. They were last seen April 5. Mr. G. G. Williamson saw six or eight individuals near Muncie, Ind., April 17, 1888; May 4, he saw three others. Mr. Otho C. Poling notes their occurrence in Adams County, Ill., but gives no account of their occurrence in summer (The Auk, VII., p. 239). Mr. John A. Balmer informs me these Crossbills were found in the vicinity of Vincennes, Ind., in the winter of 1888–9. Mr. J. F. Clearwater told me of the capture of two in Putnam County, Ind., in the winter of 1888. A flock was seen by Mr. J. O. Snyder, at Waterloo, Ind., April 27, 1889. Mr. Stewart E. White informs me he found them common on Mackinac Island, Mich., Aug. 3 to Aug. 9, 1889. Mr. H. W. McBride writes me of taking three specimens at Waterloo, Ind., April 21, 1890. Feb. 14, 1891, Mr. Stewart E. White saw six at Grand Rapids, Mich. He next noted the species March 16. He says it is quite rare in that vicinity. Mr. J. F. Clearwater gives me the following account of their occurrence in Putnam County, Indiana: "On July 27, 1891, Jesse Earll was down beside the other mill-

pond, where we collect all our water-birds, and noticed five birds on the ground, apparently probing in the mud with their bills. As they rose he shot one, which proved to be a male Red Crossbill in breeding plumage. He preserved the skin and still has it. The others were females or young, as he says none of them had any red on them."

Mr. Jonathan Dwight reports the American Crossbill on North Mountain, Penn., in June, 1891 (The Auk, IX., p. 137). Dr. B. H. Warren, in his admirable "Report on the Birds of Pennsylvania," p. 228, gives it as breeding in the counties of Clinton, Clearfield, Luzerne, Lycoming, and Cameron, in that state.

March 1, 1892, Messrs. A. B. Ulrey and E. M. Kindle report seeing six in Monroe County, Indiana. Mr. G. G. Williamson noted six near Muncie, Ind., April 16, 1892, and another April 24. Messrs. Charles D. and Lewis A. Test have kindly sent me the following interesting notes from observations of the spring of 1892, taken near Lafayette, Ind.: March 8, 1892, saw the first American Crossbill; others were seen in the following dates: March 11; April 15, 19, 23 and 30; May 1, 3, 6, 8, 18, 20, 21, 27 and 30; June 2, 6, 22, 23, 27 and 30. The birds were seen in pine trees and also in yards and along the road. Search was made for nests, but none were found.

I am indebted to Mr. Otto Widmann for some valuable notes relating to the American Crossbill in Missouri in the winter of 1891–2, and the spring and summer of 1892. He says: "I never suspected these cone-loving nomads descended into a country so flat and uninteresting as St. Louis County, Mo., where nature never rears a cone without the help of the gardener. Thousands of young evergreens, especially Norway spruces, have been planted during the past decade, but old conifers are few and far between. There are on my place, besides a few Norway spruces, eighteen pine trees about thirty years old. Half of them are Austrian pines, the rest white and Scotch pines. Coniferous trees do

not bear fruit every year, but last winter the Austrian pines were full of cones, getting ready to drop the seeds in early spring. Besides the maturing pine seeds our section had another attraction for erratic fruit-eaters in the orchards. The apple trees had yielded an enormous crop and the demand not being sufficiently great to gather them in time, thousands of apples were still hanging on the trees when the Crossbills appeared on the scene. It was in the orchard that they made their début on Nov. 13, the day after the first blizzard had visited the upper Missouri valley. From this day on the Crossbills remained in the neighborhood until the end of the month, but none were here in December and January—at least I did not notice any until they began to visit my pine trees in February. They were daily visitors all through March and until the 17th of April. From that day until May 8 none were seen, but from the 8th to the 14th they were again daily callers. After this date they were noticed twice, a party of six on June 5, and two birds, a male and a female, in one of my pines on July 21st. I looked for their nest in the tree, but unfortunately it was not there. I think now that I have met with the species on several occasion in former years, but did not know them. Frequenters of private gardens they were only seen when on wing or distant tree-top, and evaded identification. With us it is a shy and restless bird, easily alarmed, and flying a great distance. Before taking wing and while in the air they are quite noisy, with a note closely resembling the parent call of the Purple Martin (*Progne subis*). But when feeding in a pine tree the whole troop keeps perfectly silent and nothing is heard but the noise made by breaking the cone-scales. When present in May they were also feeding in elms."

While sitting on the porch of a farmhouse in Putman Co., Ind., on the morning of July 11, 1892, I saw a Red Crossbill alight on the top of a fir-tree in the yard and begin searching the cones for seeds. I watched it for about ten minutes and then, that there might be no possibility of mis-

take in the identification, I procured a gun and shot it. It proved to be a young male. On July 15 another young male, *i. e.*, a male presumably of the previous season, was secured from the same tree and left in confinement for several days, but was finally allowed its liberty. The unusual date of their appearance caused me to take especial note of it.

American Red Crossbills have, as has been shown, been noted in the region between the Great Lakes and the Ohio River in the following winters: 1868–9; 1869–70; 1874–5; 1882–3; 1883–4; 1884–5; 1885–6; 1887–8; 1888–9; 1889–90; 1890–91; 1891–2. From 1882 to 1892, they were only absent one year (1886–7). In the winters of 1882–3, 1884–5, 1887–8, the area of dispersal was wide and the birds seem to have been generally distributed. Other years, as 1868–9, 1869–70, 1883–4, they appeared or at least were observed in but few localities; but where noted they were abundant.

The results of inquiries concerning the summer range, particularly in the Ohio valley and the territory adjacent thereto, have been wholly unexpected. Summing up the occurrences in summer and the evidence of breeding, we note as follows: In the summer of 1869, they were abundant in the vicinity of Chicago, both in Illinois and Indiana. In the summer of 1878, they were found at Columbus, O., and abundantly at Cleveland, where they were reported to have bred. Dr. Wheaton refers to their having nested in Indiana as a fact well known to him. Dr. H. A. Atkins is said to have taken nests of this species near Locke, Mich., in 1880. The spring of 1885 they were common at Michigan City, Ind., and Mr. Byrkit thought they might have nested. In the summer of 1885 they were reported to have nested in Tippecanoe County, Ind. In the summer of the same year they were reported to have nested at Bloomington, Ind. They were reported from Monroe County, Ind., at three different dates in July, 1886. They were reported from Putman

County, Ind., in the summer of 1891–2. They remained throughout a part of the summer of 1892 at Lafayette, Ind. They remained even later at Old Orchard, Mo., in 1892.

These notes serve to bring more clearly to mind the peculiarly erratic character of the bird, of which we have known to some degree, before. The notes also seem to indicate that much of our lack of data is due to the scarcity of observes in years past. A few years ago the collection of data regarding almost any species of bird from Indiana, or, almost any other state, would have been an impossibility. It is not improbable, could we begin with the abundance of Crossbills at Cincinnati in 1868–9, with a number of intelligent observers equal to that available now, we could have a collection of observations covering its whole range between the Ohio River and the lakes, and perhaps including its movements for almost every year. These blank years do not necessarily signify that the bird was wanting in the territory studied, but that, for some one of a great many reasons, it was not observed. The erratic distribution of the species applies as well to its summer range as to that in winter. It seems very probable that the species breeds to some extent throughout the Ohio valley. It is true that no specimens of either its nest or eggs have been, so far as I know, preserved. Yet the evidence presented indicates that the breeding range of the species in the United States is not confined to the coniferous forests of the mountain ranges.

Loxia leucoptera. White-winged Crossbill. This species is not so often met with in the Ohio valley. Its range lies farther northward. Its distribution within the United States is much less extensive, both in winter and summer, than is that of the Red Crossbill. Audubon mentions its breeding in Pennsylvania in summer, but this is probably an exceptional case. Dr. J. M. Wheaton gives it in his Catalogue of Birds of Ohio in 1861. Mr. Charles Dury found them abundant in the vicinity of Cincinnati, O., in the winter of 1868–9, in company with the other species, in large flocks contain-

ing both species in proportion of two of the Red to one of the White-winged species. Mr. C. E. Aiken informs me that this species was in company with the Red Crossbill when they were so common in the vicinity of Chicago in the summer of 1869. He also noticed them in Lake County, Ind., the later part of August of that year. He says they displayed the same habits as the preceding species. His recollection is that the White-winged was less abundant, a little later in arrival, and more wary. They remained through the winter Prof. A. J. Cook informs me that one was killed by Dr. H. A. Atkins at Locke, Mich., Aug. 9, 1875. A pair of White-winged Crossbills were taken at Ft. Wayne, Ind., about 1878. The female is now in the collection of Mr. C. H. Stockbridge of that city. Mr. W. L. Scott notes the occurrence of a flock of White-winged Crossbills near Ottawa, Canada, "towards the latter part of June," 1882 (The Auk, I., p. 159). Mr. Fletcher M. Noe notes the occurrence of this species near Indianapolis in the early part of 1883. Feb. 6, 1883, Prof. B. W. Evermann shot two males from a flock of fifteen in a yard at Bloomington, Ind. Feb. 10, he secured a female and, a few days later, two other specimens near the same place. Miss H. E. Colfax reports it from Michigan City, Ind., June 26, 1884. Mr. J. W. Byrkit found both species in large flocks at Michigan City, Ind., the winter of 1883–4. Mr. Charles Dury reports it from Michigan City, Ind., he thinks in 1885, Faxon and Allen report seeing a few in the White Mts., N. H., June, 1886 (The Auk, V., p. 152). Hon. R. Wes. McBride has noted it as a winter visitor in De Kalb County, Ind. Dr. C. Hart Merriam gives it as a resident in the Adirondack region, but adds, comparing it with the American Crossbills, "Not nearly so common as the last" (Bull. Nutt. Orn. Club, VI., p. 229). Prof. B. W. Evermann informs me that he saw one in his brother's yard at Burlington, Ind. He says: "After watching it for a while I struck it with a stick, killing it." March 16, he saw another specimen of this species at Camden, Ind.

The only instance I know of its occurring in the Ohio valley in summer is that given by the late Mr. C. H. Bollman. He wrote me that he saw eleven on a fir-tree in Bloomington, Ind., June 24, 1886. A few days later he several times noted specimens of the other species. Everywhere in the Ohio valley this species seems to be quite rare and exceedingly irregular in its occurrence. Both Mr. E. W. Nelson and Mr. Otto Boling note it as much less common in Illinois than formerly. With the exception of the winter of 1868–9, and the succeeding summer, I do not know of its having appeared in any considerable numbers in any of the tier of states next north of the Ohio River.

OBSERVATIONS ON THE AMERICAN FLAMINGO, PHŒNICOPTERUS RUBER.

BY D. P. INGRAHAM, PUEBLO, COL.

A FEW decades ago this beautiful bird was not uncommon along the Southern border of what is now the United States, being found in almost every suitable locality from the mouth of the Rio Grande to Cape Florida. Old navigators of the Mississippi have told me that they have seen it in the lagoons far up the river, toward Vicksburg. This statement may possibly be taken with a grain of allowance, as to my mind it is questionable whether it found its desirable food above tide water. It is possible that the bird feeds in fresh water, but I have never heard of its feeding in other than salt or brackish water, unless this report is authentic.

In these days the only locality that I have been able to learn of in the United States is the extreme western and southern coast of Florida.

The bird seems to be very partial to its feeding-grounds, selecting shallow bays and lagoons where its long legs enable it to feed far from the shore, and where the bottom is so soft that it would be difficult for any heavy object to approach, for it is a very wary bird. Most of its feeding is done in the night, or early in the morning, or late in the evening. The larger part of the day is spent far out from shore, where the flock may be seen sleeping—not, however, with that continued sleep which may be observed among some birds, but in short, restless cat-naps.

The birds are very gregarious, but the report that while the flock is resting or feeding they keep a sentinel posted to

give warning of danger is a mistake, as each adult, especially the male, acts as a guard to the entire flock. In a flock of 25 birds, one-half of which are males, there is scarcely a moment that some bird does not have his head raised to survey the surroundings. I have often attempted to approach a flock when they were at rest, and have adopted every plan that I could invent to conceal myself or deceive them; but generally without avail.

My first plan was to put on a red flannel shirt, tie a red cloth around my head, get down into the water, and attempt to crawl up to them. This getting down into the water was frequently necessary, as the mud would be so soft that I could not wade, and the only way to get along was to hold my gun on my head with one hand, and with the other hand and my feet to work myself along like an alligator. But almost invariably, before I could get within 200 yards of the flock, some old bird, when he raised his head, would conclude that the red object did not look just like a Flamingo; and although I ceased to move he would give that peculiar note of warning which sounds so much like the sharp guttural expression of the word "gong." Instantly every head would be raised, and the whole flock would either take wing or, after a moment's observation, would walk off, led by some patriarch, with that stalking dignity known only to the Flamingo.

My next plan was to take some limbs of bushes, tie them together so that they could be moved in front of me, to shelter me from view, get down in the water the same as before, and push these bushes ahead of me—watching to make a move only when the birds all had their heads down. This I found much the easier plan, as it gave me an opportunity of resting my gun on the bushes when I became exhausted; and if the birds were not too far from shore they did not seem to notice it as much as they had noticed me dressed in my red flannels. As an illustration of the watchfulness of the birds I would say that often it would take me half an

hour to move a hundred yards toward the flock; so that when I had 400 yards to make to bring me within shooting range, I had a very nice little job before me. Even with all that caution, if I succeeded in getting within 150 or 125 yards of the birds I thought I was doing remarkably well.

Most of my birds were taken at very long range, and I have killed more birds at over 125 yards than at any less distance. I used a No. 10 gauge gun, loaded with all the powder that would burn inside of the barrel, leaving room in my longest shells for only about 1¼ ounces of No. "F" shot, or about 35 pellets to the load. I found that amount of powder necessary to give penetration enough at that distance. The birds were ordinarily very fat, and I have taken from the body after skinning more than a pint of oil. I found the birds very loath to fly over the land, and took advantage of this circumstance to secure many a shot. When I found them occupying some lagoon or bay connected by a narrow passage to some other body of water, I would take my position on some point of land where the water-passage was narrowest, and with two loaded shells in my hand and two in my gun, would send my assistant around to the opposite side of the flock. When he showed himself within a fourth of a mile of them they would take wing, and if there were no other opening out of the lagoon they would almost invariably take the course I had anticipated, unless the lagoon was too large, when they might alight in some other part of it. If the flock took the outside passage and came within 100 yards of me I expected to get in my four shots and usually kill four birds.

My first experience among these beautiful birds was in the winter of 1884–5, while on a trip down the west coast of Florida. My yacht was built expressly for my use in collecting, being broad and flat-bottomed, large enough to give me good accommodations for living and working, and yet to draw but little water. We took the inside passage from the Island of Malco toward the bay to the south of Cape

Romano, and turned off into a narrow passage leading into Caximbas Bay some ten miles north of Cape Romano. This bay is a characteristic feeding-ground for the Flamingo, whose food is small mollusks, crustaceans, and other marine animals gathered from the mud.

The bird is related to the *Anatidæ* or duck family, crushing its food between its mandibles and sifting out such portions as it does not wish to swallow, like a duck. The throat is so small that food must be thoroughly crushed before it is swallowed. This leads the natives in the West Indies to say that the Flamingo lives on dirt. The peculiar shape of its beak is specially adapted to its manner of feeding. With its long legs to wade, and its long neck to reach down into the water to collect its food, it brings the upper portion of the upper mandible directly on the bottom, so that it may be almost literally said to stand on its head when it eats. It is very interesting to see a flock feeding, especially when the bottom chances to be a little hard, so that they have to dig their food out from the earth. The water prevents their scratching like a fowl, but they go through the same motions, only not so fast, and as their long legs go up and down it reminds one of a regiment of soldiers marking time. After they have stirred up the earth for awhile, they put their heads down into the water, gather up the results of their labor, and then "mark time" again, constantly swinging around and gathering the earth up into a mound. When they are through there will frequently be a mound five or six inches high and three or four feet across.

Caximbas Bay is perhaps five miles across in either direction, and the larger portion of it so shallow that a boat drawing fifteen inches of water can only pass over it in high tide. It is connected with the Gulf of Mexico by a narrow pass, little more than 100 yards wide. The bottom of the larger portion of the bay is soft mud, which has evidently been carried in through the pass from the Gulf, or brought down from the neighboring Mangrove islands where it has been

accumulating for ages; it is so soft that if a person should jump overboard he would go into the mud to the shoulders. The bird is web-footed to enable it to walk in this soft mud, and not to swim. I have never seen one alight on the water, or take to the water beyond its wading depth, unless wounded. But they can rise from deep water, as I have seen a wounded bird do, when he was able to fly but a few hundred yards.

We reached the little bay an hour or two before sunset; but the water was so low that we struck bottom and were compelled to anchor for the night. At daylight the following morning we weighed anchor, and after proceeding a few hundred yards came in sight of a flock of seven beautiful Flamingoes—the first that I had ever seen alive. They were feeding not far from a small island that sheltered them from view from our anchorage. We at once downed sail and attempted to reach the island with our small boat, which did not require more than five inches of water; but we found more mud than water, and were compelled to give it up and wait the incoming tide. A little before night, when we deemed there was water enough, we started for the island, and after reaching it covered our little boat with the boughs of trees. At dusk we moved out around the point of the island. I had taken my place in the bow of the boat with my gun, and my man took an oar at the stern to scull the boat toward the game. The tide was high; the birds were feeding toward the island, and did not seem to notice us until we were within about 125 yards of them, when one bird raised his head, gave his peculiar note of alarm, and took wing. But before the others could rise I gave them a shot which resulted in the best bird in the flock being left on the water. It proved to be an elegant male in perfect plumage, and is now in the museum of one of our eastern colleges. We did other work for three or four days, hoping that the birds would return to the bay; but as they failed to do so, we continued our course southward.

A few days later we anchored a few miles east of the easternmost Cape Sable, on the extreme south point of the state. Early next morning a flock of 31 Flamingoes flew past us eastward, and a fine breeze soon found us following them. My sailor knew the ground well to the southeast of Cape Sable, having forty years or more ago often gone with his father Flamingo-hunting in that vicinity in summer, when the birds were moulting. During the rainy season in summer the shallow bays and lagoons frequently became too deep for convenient feeding, and the birds strayed out on to other flats. The natives were in the habit of taking large numbers of them for food, during the moulting season, when the birds cannot fly, the feathers being so few and the body so heavy. The plan adopted is for a number of persons to go out with long ropes, surround a flock, drive them together in a huddle, then stretch a line of rope around them, and at a given signal rush toward the flock. The birds being unable to fly in their efforts to escape attempt to run past their pursuers, but are tripped up by the rope. When thrown down into the water it takes them some moments to regain their feet, and thus their captors gather them in. Fifty years ago they used to be taken in large numbers and carried to Key West, where they were sold for food. The same plan of capturing is now adopted in some of the West India Islands, and if it is not prohibited will soon exterminate the species. The flesh of Flamingoes is not specially desirable for food, being strongly flavored with the mollusks on which they feed, and very oily too—I have taken a pint of pure grease from the body of a single bird. But the natives of the West Indies will eat almost anything—even young Man-o'-war birds and Boobies. Our sail that day brought us well up to the eastward, and late in the afternoon we entered a bay about seven by fifteen miles in extent, almost every square rod of which was shallow enough to be waded by the Flamingo. The bottom largely consisted of a soft, sticky clay, as though composed of fine particles of dis-

integrated coral, so soft that with one hand I could set a pole two fathoms down in the mud, and so sticky that one cannot wash the mud from anything without rubbing it. Although the water in these bays is so shallow, much of it being not above eighteen inches deep, yet it is so permeated with this soft white mud, which is stirred up by the action of the waves, that it is impossible to see the bottom, and after a day or two of more than usually heavy wind the whole bay reminds one of a large bowl of milk.

When about halfway across this bay—it being ebb tide—our boat stuck in the mud and we could go no further. After lowering sail, I climbed to the masthead to learn if anything could be seen. Almost to the east of us, where the then setting sun reflected the light to the best advantage, was a long line of red extending fully a half mile, reminding one of a prairie fire at night. I doubt whether De Soto felt any more pride when he first saw the broad waters of the Mississippi than I did at the sight before me. I took off my hat and swung it and shouted "The Flamingoes! the Flamingoes!" It was then that I first recognized the import of the word *Flamingo*—flame-colored. I had spent fully two months each of the two preceding years, to find these birds; and I now felt I almost had them in my grasp—a vain delusion!

As it was too late for any work that night, the flock being fully four miles away, we prepared for an early start next morning. Breakfast was over long before daylight, and as soon as we could see we were in our little boat, headed for the flock, with the expectation, if we could not get near enough to reach them in this way, to go ashore, cover our boat with bushes, and try the same plan that we adopted a few days before in Caximbas Bay. When more than half a mile from them the birds rose on wing, and after turning about a few times, flew to the extreme further part of the bay, and alighted. The flock consisted of not less than 2,500

birds. As they were now fully seven miles away it precluded all further work for that day. So we went ashore and loaded our little boat with bushes for the morrow.

At daylight next morning we were in our boat, and after placing our bushes so as to completely hide, not only ourselves but our boat, we again set out for the birds, but with no better success than before. For six successive days each week, and for six successive weeks, did we devise every plan that we could conceive of, every day looking out upon that beautiful flock of not less than 2,500 birds. In all that time we could never get within 800 yards of them. Then our water-supply became exhausted, and we set sail for Key West, about 120 miles away, for new supplies; and thus ended the Flamingo campaign of 1884.

The following winter I again visited the same locality. That time our boat stuck in the mud within about 500 yards of a point of land lying between the large bay and a smaller one still further eastward. Here we lay for two weeks without tide enough for our boat to swing to the wind. There were not nearly so many birds as the year before; but there was scarcely a day that we could not see at least one thousand. They fed mostly in the upper bay, came down in the morning to rest in the larger bay, and usually returned at night. Their flight led them around a point of land 200 or 300 yards from shore. Taking advantage of this circumstance one of us was posted on the shore, and the other remained in the boat. If the flock flew nearer to the land than to the boat, the man in the boat would swing his hat and perhaps fire his gun to turn their course as near the land as possible. If they came within reach the one on shore would give them a shot, or if they flew well out, the man on shore would try to turn them toward the boat. In that way we succeeded in getting six birds. We learned that whenever a bird was wounded and yet able to fly it would leave the flock, and thus we secured one or two birds that we otherwise would not have obtained. In one case the bird flew fully a mile

before it came down on the water; and when we reached the spot we found it dead. The following year brought me no birds, although I spent several weeks with them; but I have since done some very fine work in the West Indies, with better success.

The bird makes a peculiarly beautiful appearance on the wing, with its long neck extended directly out in front, its bright feathers under the wing, its black primaries, and long legs held straight out behind.

The people living on the islands southeast of Cape Sable are of the opinion that the birds all go to Cuba or the Bahamas to nest, as they see them passing to and fro, in those directions. But I do not coincide with these ideas, and think I know about where the nests are located, but it would be almost worth one's life to visit the locality during the breeding season, owing to the millions of mosquitoes. I do not think the Flamingo is a bird of very long flight, although they doubtless cross from Florida to Cuba and the Bahamas. I do not think they ever alight in passing.

The nesting habits are peculiar. They nest in great colonies, and when not disturbed occupy the old nests the following year. Not perhaps the same bird using its own nest of the former year, but the colony as a whole occupying the same nests. I have seen not less than 4,000 nests in one group, as close together as they can be placed. The most desirable locality seems to be some very shallow and very muddy lagoon, where the nests are almost unapproachable. They are made of soft mud which is worked up into a pyramid, 18 or 20 inches across at the base, perhaps 15 inches high the first season, and about 10 inches across on top. This mud dries and becomes exceedingly hard, so as to retain its form for years. The birds occupy the same nests year after year, each year adding a little to the top of the nest, so that nests frequently become two feet high or more. The nest is hollowed out a little on top, and the eggs, usually two, are deposited on the bare earth.

The egg is large, averaging about 3½ by 2¼ inches, and when first laid is pure white, being covered with a flaky substance, but bluish when this is removed. The bird takes a position on the nest like that of most other birds, but sits a little further back on account of its long legs, thus bringing the eggs a little more toward the breast. It does not sit astride of the nest, as it has so often been represented, but doubles its legs under the body like other long-legged birds.

The eye is quite small, but seems to be endowed with wonderful vision, and can apparently see about as well at night as in the daytime.

I know of no authentic data as to the age the Flamingo may reach. But from examination of the ovary—allowing two eggs a year, as the bird lays but once unless disturbed—and from knowledge of the time required to attain full plumage, I judge that its life must be fully 50 years. The bird of the first year is nearly gray, but after it sheds its first winter plumage it assumes a reddish color. One familiar with Flamingoes can easily distinguish their ages, at least to the fourth year, and it is evident that they do not reach their full brightness before the seventh year. I never could distinguish the sex except by the size of the bird; but in more than 100 cases where I have judged by the size of the bones, I never found that I had been mistaken when I examined the sexual organs. Whether the birds mate for life or not I cannot say; but from such observations as I have been able to make I incline to the opinion that they yearly select their mates.

The bird is in fine plumage only in winter, and after the first of April is not desirable as a specimen, as the feathers then become faded and begin to look worn and dingy, although the birds do not nest until the last of May or early in June. After they have mated there is little trouble, as compared to the winter season, in securing them, but at that time they are of little value. The largest bird I have ever mounted stood 64 inches high; but I saw one in the

winter of 1893 that would have stood at least a foot higher than that.

Never yet when I have approached a wounded bird has he made any resistance or show of fight. When broken-winged or otherwise injured, and unable to escape, he invariably drops down and sticks his head under water. With but two exceptions, I have never been able to drive a wounded bird on to the land.

One of the most interesting observations I made was during my last year's work. We always called it the "dress parade." We were watching a flock of 300 or more, standing at rest some 400 yards from shore, and hoping that as the night approached, they might commence to feed and work near enough to shore to be reached. About an hour before sunset a few birds commenced to feed, and soon a dozen or two of the largest males began to march backward and forward in the rear of the flock. Nearly every male soon joined in this concourse. The line of the flock lay about parallel with the shore, and the males took their position directly in the rear, in a solid body. As though at a given signal, every bird commenced to march, passed to the extreme further end of the flock, and halted, making a great noise, as if every bird in his loudest voice said, "Don't I wear a splendid uniform?" After a moment's pause, all faced about, marched back to the other end of the line, and then cried again, "Ain't I a beautiful bird?" When marching back and forth they moved in almost as perfect order as a platoon of soldiers. Thus the parade continued for nearly an hour, until one by one the birds dropped out of the ranks and commenced to feed.

FACTS FROM THE FIELD.

BY E. H. CRANE, NILES, MICH.

No, it is not strange that birds are scarce and insects plentiful, when we consider that, since this country was settled by white men, the demand for building material and tillable land made it a necessity to denude the country of much of its timber, flora, and foliage, in making room for commercial and domestic improvements; that nearly every family in early days owned at least one gun; and that there are four guns now where there was one in the past, even the small boy of to-day being provided, not only with bows and arrows, like those of the Red man, but with sling-shots, spring and air guns, Flobert rifles, and many other modern devices, all of which are daily used in wanton destruction of our little songsters that never do harm to men. To kill birds, the natural enemies of insects, makes it possible for the latter to increase more rapidly. The removal of wild foliage and timber has forced insects, in a great measure, to seek cover, food, and breeding-grounds among cultivated flowers, vegetables, shrubs, and trees. What is more natural than for birds to follow in pursuit of their insect food? Men should welcome, not destroy or exterminate, them. When the country was comparatively new, farmers suffered somewhat from wild fowl, such as Turkeys, Geese, Ducks, Quails, and Pigeons, which were destructive to crops; and then the general warfare with guns began, not only upon large gregarious and granivorous species, but also upon the small birds which subsist largely on insect

food, yet are fond of berries and fruit. From lack of mature judgment, based upon knowledge of the habits of the various kinds of birds and their food, man failed to realize that by injudicious use of the gun he was fast reducing his friends, by killing birds which were the most formidable enemies of the very types of insects now known to be most injurious to flowers, fruit, and grain. There are few birds which do not consume insects enough each day to pay for all the fruit or grain they eat. A pair of Turkeys and their brood, wild or tame, devour grasshoppers and larvæ enough in a single season to pay for five times the corn or wheat necessary to fatten the whole flock in the fall. The tiny Hummingbird not only visits flowers for honey and sugar; its little stomach is often filled with almost microscopic insects and their larvæ, which are injurious to flowers. House-wrens subsist largely at certain seasons upon curculios and other larvæ injurious to fruits. The same may be said of the Warblers, Creepers, and other species. The Meadow Lark, which is a song-bird, often killed by hunters as game, is known to devour hundreds of cut-worms, and I believe these worms to be its favorite food. Even the granivorous and pugnacious English Sparrows eat a few worms and spiders, just for butter on their bread. A farmer's son in Berrien County, Mich., took the craze for getting rid of these little pests, and accordingly killed something over 100 birds; ambitious to obtain the bounty for his deadly work, he brought the heads to the proper official, who, being an ornithologist, readily discovered that 90 per cent. of the heads were those of Bluebirds, Chipping Sparrows, and Song Sparrows. The boy was glad to get off without being heavily fined, and without bounty for the 10 per cent. of English Sparrows. Almost every boy and many adults in the country, village, or city, with the English Sparrow craze for an excuse, kill more or fewer song-birds each day. In fact, no estimate can exaggerate the damage done by this wholesale slaughter of the song-

birds under the cloak of the Sparrow Bounty Law. Let us hope that things may not be ever thus. Since it is becoming better known that the help of birds is essential to the successful culture of flowers, vegetables, fruits, and crops, by the destruction of insects, may we be able in the near future to furnish ample protection for these our friends.

AMATEUR ORNITHOLOGY.

BY REV. GEO. B. PRATT, CHICAGO.

In the year 1883 I began my ornithological work, with special attention to the migration of birds in the valley of the Mississippi River at Hastings, Minn., about 20 miles south of St. Paul. The first spring arrivals of birds as individuals, then in collective bodies, were my especial duties of observation. I had previously seen in the St. Paul Pioneer Press an advertisement, or more properly a call, by Prof. W. W. Cooke, then living in Wisconsin, for observers in the valley of the Mississippi. My first thought was, "Why! you don't know anything about birds. Why take this up? You have had no experience." The idea was attractive and worked upon me considerably; so I finally decided, and wrote to Prof. Cooke that I would take the job for that locality. I am reminded now, when thinking of my ignorance at that time (and let me say that much of that ignorance has never ceased) of the man who was asked to teach a class in zoölogy at a private school, and who agreed to do it; and then went home and hunted in his dictionary to see what the word "zoölogy" meant.

I kept up the work, along with others whom I occasionally met in Red Wing and Lake City, towns on the river, until Prof. Cooke finished the object he had in view, for which I had sent him semi-annual reports; after which I transferred my reports to the Smithsonian Institution at Washington. In 1885, I removed to Oak Park, Ill. Since that time, with the exception of two or three years past, I have

made observations, and in the whole ten years work have never seen the time when it was necessary *to strike*—indeed, it became an intellectual pleasure and a healthful recreation. I have learned that ornithology is a branch of natural science which, once entered into heartily, never becomes stationary, increases in its demands and may be made a perpetual source of delight and profit. When looked at merely in the light of a hobby it becomes a splendid thing for a busy person. Of course I put it on much higher ground than this; yet there are instances when a professional man cannot make it anything else for himself but a hobby, partly owing to the bread and butter which he finds necessary to provide for himself and family; and I think that for most of us to make our bread and butter out of ornithology would be a hard fight.

In making observations my main study was to spot a bird the first time so as not to forget it. And when this failed it seemed necessary on the spur of the moment to use a little mustard-seed shot in a small gun, the better to take time to classify and remember. I did not do much of this cruel work. I soon discarded the gun, and have ever since used in its place a first-class field-glass, such as army officers use. Mine is a $12 glass with "Lemaire, Paris" and "Bœringer, St. Paul" around its rim. I found my heart growing tenderer to all the bird creation. I hated to shoot them. I now despise shooting, and though formerly fond of Duck, Goose, Quail, and Pigeon hunting I have about made up my mind never to kill game or birds of any kind.

Study of the flight, habits, and ways of birds adds every year to the main stock of knowledge. In the realms of nature it never ceases. It is as undying as the flow of Tennyson's brook. After the period when it ceases to be merely a hobby or a fad, then the real life begins. To me it has been a great relief from many arduous and taxing occupations. I am reminded, in this necessary change of duties, which is at times so acceptable to all of us, of Mr. Gladstone,

of whom it is said that when in his profound study he gets tired of one book he turns to another on an entirely different subject.

Year after year new birds come into the life of an amateur. I have found if I obtained observations of only one or two new birds in a season—birds that I had never seen before, there is a feeling of great satisfaction. I realize that there comes a time when a scientist has pretty nearly exhausted his field of migration; but in the department of habits I doubt whether the field is ever exhausted.

A *bona-fide* ornithologist may laugh when I say I never knew a Wood-thrush until three years after I began work. Location has something to do with this. Certain birds are never seen in certain localities. Some are in one part of the country, some in another. Mr. John Burroughs wrote at one time of the valley of the Hudson River, that if he found a Brown Thrasher in a circle of six miles he was fortunate. The red squirrel and the Cow-bird were their greatest enemies, as these are also of scores of other birds. I think he said three-fourths of the destruction of birds was due to these two rascals. In Minnesota I stood one day where, on the tops of three magnificent trees, I could hear and see three Brown Thrashers singing away for dear life. I knew also that three nests were situated somewhere within the circumference of half a mile, one of which I found afterward. This bird always sings at quite a little distance from his nest. And what a repertory it is! Magnificent! Cat-bird, Mocking-bird, Oriole, Rose-breasted Grosbeak, and Robin, all combined in a flow of song which ripples out from just one set of reeds, just one marvellous throat-formation! I prefer a Brown Thrasher to a Mocking-bird. If cages must be in houses and birds in cages, give me a cage with a Brown Thrasher in it.

I cannot forget the pleasure I felt when I first found a Bobolink in his summer dress. The night-cap covering of the little fellow was very striking. I had in Philadelphia eaten

his plump little body as a Reed-bird. I had read of him as a Rice-bird in the Carolinas, and as a Butter-bird in Cuba. After five years I found his nest in the prairie, reminding me of Thoreau's long search for one, when all the time he was within twelve feet of it. Thoreau has also given an almost perfect description of his song. He hears him in an apple tree concealed from view. The bird is "just touching the strings of his theorbo, his glassichord, his water-organ, and one or two notes globe themselves and fall in liquid bubbles from his tuning throat. It is as though he touched his harp within a vase of liquid melody, and when he lifted it out, the notes fell like bubbles from the trembling strings. Methinks they are the most liquidly sweet and melodious sounds I ever heard. . . . Away he launches and the meadow is all bespattered with melody. Its notes fall with the apple blossoms in the orchard. . . . It is the foretaste of such strains as never fell on mortal ears, to hear which we should rush to our doors and contribute all that we possess and are."

There is another description of the Bobolink's song which I have never seen in print. It was given to me from memory by word of mouth, by an Ex-Secretary of Agriculture, formerly under President Hayes' administration:

"Bobolink, Bobolink,
Che-wink, che-wink,
Che-weedle-weedle,
Bobolink,
Never let Mary Sink
Gad about with Harryhoss Muckle Weaver,
Nor shall she marry
Michael Mangle-Wurtzell."

C. H. S., in the Chicago Tribune of April 28, 1895, writes: "Some fine morning in May you will be apprised by an extraordinarily voluble outburst of jingling melody that

'June's bridesman, poet of the year,
Gladness on wings, the bobolink, is here:

Half-hid in tip-top apple blooms he swings,
Or climbs against the breeze with quivering wings,
Or, giving way to 't in a mock despair,
Runs down, a brook of laughter, through the air.'

"He is the jolliest bird that flies. There is no other who sings with such joyful, enthusiastic abandon. He is always hilariously happy. He not only sings from his perch, but in his flight he rains down a perfect shower of tinkling, rollicking, ecstatic jubilation. His is not the highest style of art, but as a comic opera-singer he is unrivaled. His lack of the purest quality of voice does not disturb him in the least. He probably consoles himself with the thought that when the Lord gives any one a fine tenor voice he does not seem to think it necessary to give him either manners or morals."

There is one bird to which I was always attracted in my home in Minnesota—the Nuthatch. I shall never forget his way of climbing around the boles of trees, particularly when he went spirally head downward—a feat that no other bird is able to do. He also roosts, I have read, with his head downward, hanging on to the bark.

I found in my first observations that I needed some book to be my guide. I was directed to Jordan's "Vertebrates," which gives a fair and short key to North American birds, and is also an excellent guide to mammals, reptiles, and fishes. Upon the margins of my book, opposite many birds, is the letter "M," which means a check list of Minnesota birds, taken from a list made by Dr. Coues before he published his "Key to North American Birds," which has since become my special court of appeal.

A series of books, however, is a necessity. My library began to increase. It was apparent that as the dollars went out for books my pocket-book flattened, so that my wife was occasionally startled at the docking off of one end of the household machinery to supply the other end. I gradually accumulated all of Thoreau's works, ending with the one called "Winter," containing Thoreau's notes com-

piled by Mr. H. G. O. Blake, to whom I once wrote and asked if such a book would not be forthcoming, feeling that "Walden" was not sufficient to contain all the information on that season which Thoreau was capable of giving. Mr. Blake's answer convinced me that I gave an iota of suggestion to the final appearance of this book. I have studied Thoreau religiously—I mean in the sense of having read his journals almost daily for a number of years. Thoreau was a transcendentalist, I was a theolog; but it made no trouble with me. No! the kingdom of birds is one of the kingdoms of God, teaching by all sources and from all sources marvellous parables illustrating His grand and beautiful creation. Thoreau's writings of Spring, Summer, Autumn, and Winter, are indispensable to a true lover of bird nature, although he treats of kindred topics, as of fishes and plants. Thoreau had microscopic eyes which few men possess. He looked far into the infinitesmal depths of nature. He used the microscope rather than the telescope. For this reason he was called a pessimist and not an optimist. He was terrene and not celestial. Some natures will find benefit here—such natures as are always up in the clouds, never down upon the surface of this world, where we live humdrum lives. The pots and kettles of insect life are as necessary within the realm of economic nature as the highest nest of an Eagle upon the distant crag.

There are some other delightful books which were my study, such as Waterton's "Travels in South America;" White of Selborne, whose centennial birthday was recently celebrated by some devout admirers; "Notes of a Naturalist in Her Majesty's Ship Challenger;" Buckland's "Curiosities of Natural History;" and Wood's "Birds of the Bible." Of our own American writers, besides Thoreau, my library contains books of Dr. C. C. Abbott, who has explored many haunts in the valley of the Delaware River; and John Burroughs', writings, not unjustly compared to some of

Thoreau's—with pessimism thrown out, however. Maurice Thompson's "Byways" and "Sylvan Secrets" are delightful reading. Olive Thorne Miller and Bradford Torrey show their book faces in attractive familiarity. I also have "Birds through an Opera-Glass," by Florence Merriam; "Our Common Birds," by Jno. P. Grant; "The Birds' Calendar," by Parkhurst; "In Bird Land," by Kayser, and "Birdcraft," by Mabel O. Wright. I must be understood in this paper to be simply giving my personal experience and possessions; I attempt nothing further. I find, as you may have noticed, that ignorance is a close ghost arising before me—the substance of Ornithological knowledge being inexhaustible. The numbers and the classification of birds of all countries may be approximately defined, but the nature, the habits, the ways of the dear creatures have never and can never be fully deciphered. I think a close observer will find new points constantly arising in his study and observation.

While the best observations can be made in the country town, the question arises, How much can be done in the city life? Is there any way of getting at bird-life from the heart of a city? I believe the spring migration of birds may be very fairly seen in some of our city parks, better than some people may apprehend—even to the coming of the Warblers, that phalanx of beautiful, parti-colored bodies which nearly drove me wild to classify when I first began, and memory now is very treacherous when brought suddenly to the test. Did anybody see in this very Art Institute, during the Congress of Religions, a little Warbler flying for many days among the girders and bright flags of the Hall of Columbus? It was to me an emblem of a divine spirit hovering over that great gathering, and reminded me of Bayard Taylor's expression about the Mourning Dove, (emblem of the Holy Spirit, as I take it), which he found in every country in which he traveled.

On the 3d of April, 1893, I spent part of an afternoon in Douglass Park, Chicago. I counted 4 Robins, 2 Juncos,

6 Yellow-breasted Woodpeckers, 1 Flicker, 5 Crow Blackbirds, 1 Kingfisher, and 1 Wood Thrush. On May 9th, 1893, in the same park, I saw 10 Myrtle-birds, 2 Yellow-green Warblers, 3 Chipping Sparrows, 4 Flickers, 1 Oriole, 9 Robins, 3 Brown Thrashers, 1 Wood Thrush, 2 Ruby-crowned Kinglets, 2 Brown Creepers, 1 Black-and-white Creeper, 2 Red-headed Woodpeckers, and 3 Blackbirds. This proves one can go to the suburbs and find splendid days for observation.

There is something barbarous in the desire of any person, young or old, to destroy birds. I am charitable enough to think it may come into a boy's mind purely from the love of showing his skill, how accurately he can aim, and how close he can come to the mark. Akin to this destruction, is that of gathering eggs "to make a collection," as they say. It becomes a craze in the spring for boys to rush out into the fields, beside the tangled brush of streams, and climb trees to rob nests. This is done ruthlessly, without any forethought. It is dreadfully bad. At this time of life older heads should direct, older eyes watch, and strong words of counsel be used. I venture to say that in the colleges and schools of North America there are eggs enough for all the scientific culture that is needed in this age.

As I close this paper a thought cognate to the subject comes to mind. Every motion in nature, I believe, has been imitated by man, except that of a bird flying. The Duck or Goose swimming on the water is shown by the side-wheel steamer. The fish in the water is imitated by the propeller which now takes the place of paddle-wheels, and by that quite late invention of the electric torpedo. Will a bird's flight ever be successfully attained by man? I believe it will. There are not data enough yet, I admit, to make a perfect argument or come to a conclusion. But the science of aviation is slumbering in men's minds. Invention, the characteristic to a Yankee's intellect, is constant and perpetual. There is a seething desire in some people to fly

with the clouds, to navigate space above us, to girdle the world in forty minutes—nay, to reach the stars. The balloonists are working at the problem. They die by scores, in what we perhaps justly call extremely foolish attempts. But I remember that Franklin was called the greatest of cranks and esteemed a madman when he first experimented with the kite-string and electricity. The conditions of aërial navigation are no more complex than those of all traveling. Wings are the fondest desire of our hearts. This has been so ever since a certain author wrote, "Oh! that I had the wings of a Dove." Will the Dove ever find an electric bird of man's invention flying by its side? Angels have always been pictured with wings. Birds are angels in disguise. If I could believe in the transmigration of souls, I should say, "put me into the body and seal upon me the wings of a Wood Thrush, which has a song equal to its wings, that I may have music by the way."

NOTES ON THE OBSERVATION OF BIRDS.

BY OSCAR BIRD WARREN, PALMER, MICH.

How many there are who go through life with half-closed eyes and muffled ears—who neither observe the diversified forms of nature about them, nor hear those mysterious sounds, the audible language with which she communicates with her devotees! The average person, indeed, instead of becoming a better observer, loses the perceptive powers of youth. In childhood all is interesting; every object is more or less attractive, and readily makes its impression on the mind; but with advancing years comes careless observation. So much is seen and heard that, growing indifferent to our surroundings, impressions lose their vividness, pleasures decrease, and dissatisfaction creeps into our hearts. Those who, aided by the power of careful observation, are able to read the secrets of nature, find life more uniformly pleasant, fewer moments of idleness, and a satisfaction never found in the pleasures of the hour. They can shake off the cares of the busy world and spend a brief time each day in their favorite diversions—the entomologist with the insects, the botanist among his flowers, the ornithologist in the company of "the bright tenants of the earth and air." In whatever line opportunity and inclination lead one, if it absorbs the attention during the time devoted, the observer will have received great benefit from the relaxation, be able to accomplish more energetic work, and live a longer and more useful life than one who knows no relief from daily care and trials.

For me a more pleasing and elevating recreation than the

study of birds cannot be found in all the catalogue of pleasures. Birds have been my friends since childhood, and many of my most pleasant hours have been spent in their companionship. So varied in form and coloring are they, so unlike in disposition and habits, with so much of airy life in their fairy beings, they ever invite and hold my attention. In temperate seasons, awakening me by their morning melodies, they accompany me in walks and rambles, visit me while at work, enliven the beautiful summer hours, and brighten the dreary days of autumn. Even when Boreas sends his chilling breath over the land, driving the avian hosts southward, some stanch and hardy friends remain, and others come from the wild northland to spend the winter months. Never is a day so cold as to daunt the courage of the merry Black-capped Chickadee, or of his cousin, the Red-bellied Nuthatch ; they are seen throughout the year. Scarcely is there a day in winter on which the Blue Jay will not be seen about our houses, gathering up waste scraps of food. A few Hairy and Downy Woodpeckers spend the whole winter with us, making friendly visits to the ash pile or to bones provided for them, for which they are always grateful. Occasionally an Owl is driven by hunger to the poultry house. Pine Grosbeaks and Crossbills come to feed on the mountain-ash berries; flocks of rosy Redpolls strip the birches of their catkins and glean the seeds from weeds and grasses. Scores of cheery Snowflakes drop down from leaden clouds to tell us of the approaching snow storm, a few of these storm messengers remaining about the barns all winter feeding on grass seed and wasted grain.

Under changed conditions birds behave in very different ways, all of which are interesting and worthy of the most careful observation. When will we learn all the ins and outs of the common Blue Jay? How little, in fact, we know about his many characteristics. In this northern land, throughout the winter months, Jays remain about the houses, picking up food of all kinds and qualities. They are most numerous

around the lumber camps, where they resort in large numbers, accompanied by the Canada Jay, familiarly known as the "Whiskey Jack." Here they grow exceedingly tame, coming to the door of the camp kitchen for food, and if unprovided for scolding the cook in the most energetic manner, aided by the Chickadees and Nuthatches—bright little sprites which come to live with the rough loggers and grow into their very hearts before their acquaintance ends with the breaking up of the camps. As spring approaches the Jays decrease in numbers; so that, by the time the woods are peopled with the hosts of summer birds, seldom is a Jay seen, unless an unfortunate Owl takes a diurnal airing. Then, soon after the first cry of "thief" is sounded, a host of blue-coats appear from parts unknown to take charge of his owlship, scourging and harassing him unmercifully till he seeks a safe retreat in a hollow tree or the depths of the thicket. Their stealthy movements during the nesting-time of the small birds—a demolished nest, fragments of shells, a retreating spot of blue, and silence save the lamenting of the robbed innocents when they return to find their treasures rifled—scenes like these cause dark suspicions to shroud this merry vagrant, and make us doubt his good intentions. The Jay is the typical bird of the fall, and never seems at his best until the sharp frost drives his summer companions south and paints the leaves with glowing colors. Then he leaves his seclusion, gives up his skulking habits and is before the world a bird, true blue. The other day, as I stood concealed near a fine growth of hazel watching him gather the juicy nuts, I thought he never seemed so bright and attractive; those low, modulated notes which he constantly uttered, never so sweet and pure; nor his handsome coat so blue, as when brought out in pleasing contrast with the rich golden background of autumnal foliage.

The true bird-lover is more interested in the study of the songs and habits of birds, than in amassing large collections of eggs and skins. More pleasant, indeed, is an hour spent

in some wooded dale in the companionship of the spirited sweet-tongued songsters, than a day among lifeless skins, searching for infinitesimal differences in size and plumage. However, collections should be made, especially in a locality whose avifauna is but little known; yet these collections should be as small as absolutely necessary, in the number of skins and eggs of each species. The greatest care must always be taken in the preparation of each specimen to make it as perfect and durable as possible; and every portion that might serve for study should be preserved for future reference.

Knowledge of the songs and notes is much more valuable than remembrance of scientific terms and names. Nothing is of more importance to the itinerant ornithologist than thorough acquaintance with the notes of birds; for, when making observations in different parts of the country, he will be able to record with certainty the occurrence of those species with which he is familiar, if he but hears their songs or peculiar chirping calls. Who would think it necessary to *see* a Whip-poor-will singing in order to identify it? Indeed there are many who could not distinguish it from the Night-hawk unless they heard its song. The twittering of Swallows, the chattering of Swifts, the drumming of the Grouse, or the whistling of the Quail, are familiar sounds to any country lad; yet equally so to the careful observer, are the notes of the woodland Warblers, the songs of the Sparrows, and the piping of the Plovers. He is as certain of the presence of these rarer birds as the farmer boy of his commonest feathered friends.

It is during the seasons of migration that we listen with the greatest eagerness for the first notes of the returning birds. Perhaps we are out for a ramble some early spring morning, when afar in the clouds of dawn we hear a faint pure note. Nearer and clearer comes the sound, till from the limitless expanse of blue down flutters a form of azure touched by the ruddy gleams of the rising sun. Did we need to see him first to know him? No, those first sweet

notes as truly told us as his presence itself, that our little harbinger of spring, the Bluebird, had returned.

In the distance is heard the hoarse cry of the Canada Goose, and soon we see a flock of these hardy birds, heading for their summer home beyond the lakes. Off in the lowlands the vociferous Killdeer is piping as he flies restlessly about his reclaimed possessions. Down in the thicket a company of Juncos are twittering, and there we see the white feathers of one's tail as it scurries past. Up in the maples on the hill, some early Robins pause to rest and discover their presence by well-known chirps. From the cedars near by we catch the peculiar call notes of the first Hermit Thrush, which is to charm us by his summer songs. Now as the sun drives back the fleecy clouds and bathes the earth in floods of light, that choice musician, the Song Sparrow, pours forth his welcome melody from the willow beside the running brook.

During the warm months the most fruitful times for observation are those moments just preceding sunrise and for an hour or two after. This is the time we find birds awakening into activity, then is when their songs are sweetest. Bird-life is also equally interesting for an hour or so at sunset, as then all are astir, playing, feeding, and singing their vesper songs before night draws her dusky curtains over the sleeping world.

How easy it is then to see the birds at their best! For at these hours we can most conveniently escape from the routine of daily life to take an exhilarating walk in the open air, and with sharp eyes and sympathetic ears, aided by field-glass and note-book, capture some of the lively secrets of nature, returning to our work refreshed by exercise and contact with nature.

Those who wish to devote a large share of their time to this interesting study should be in the field at all hours and seasons, during foul as well as fair weather; for it is only in this way that one can hope to become acquainted with all

the characteristics of avian life. During migration a sudden change of weather is sure to bring a bird-flight, and if the observer is in the field early, perhaps he may be able to note an especially rare specimen, which otherwise would have been lost to him.

This spring a radical change in barometric conditions, followed by a heavy fall of snow on the 25th of May, stopped the hosts of migrants and produced an unusually large bird-wave. How surprised they looked to be met by such a welcome! How cold and uncomfortable they seemed! Some, however, rather enjoyed it. The Juncos chirped pleasantly, the Rose-breasted Grosbeaks whistled merrily, and the White-throated Sparrows sang their sweetest. But the poor little Warblers were affected differently; being wholly unprepared for such cold treatment, and without food, numbers perished in the snow. The early Myrtle, the Palm, the Black-and-white Creeping, the Nashville, and other Warblers were found dead during the storm. The Redstarts fared the worst, and many a bright bird which in summer would have enlivened our northern forests by its spirited songs was buried in an icy grave.

Of all bird pictures seen during this storm the most beautiful for contrast of colors—a background of green hazels, in the distance dark pines and hemlocks, above a humid sky, and in the foreground a Tanager perched on the projecting point of a buried stub, appearing like a great drop of blood upon the spotless snow.

In the spring migrations birds are most plentiful on the sunny side of the evergreen woods and groves, along the hedgerows, or among the shrubbery near human habitations; while in the fall migrations they are also found in highest deciduous trees, in the second growth of hardwood on the hills, and in the thickets along the creeks. A few days of rainy weather during the last of August and first of September brings the shore birds and waders; then the lover of these gamey fowls will find them

on the sand bars, along the lake shores, on the banks of rivers, and in the marshes.

The observer must visit all localities—marshes, swamps, hardwood and pine forests, fields, meadows, low creek bottoms, and in fact all places presenting any diversity of conditions, if he wishes to know every bird of his locality.

In the perusal of nature, as in the reading of books, to derive the most benefit copious and accurate notes must be taken. The memory is a treacherous servant and cannot be depended on; therefore we must take our notes in the field and then rewrite them at leisure in the study.

During migrations the number and sex, if possible, of each species seen on the first days of its appearance should be taken. Such observations become invaluable when comparing notes with other observers, to determine the time elapsing in the passage of the birds from station to station, and the route taken. Such a record, covering the observations of several years, will be interesting as showing the regularity with which the different species come and go. Thoreau is said to have been so careful an observer that should he have fallen into a deep sleep lasting many years, on awaking, he could have told the day of the month by the flowers that were blooming and the birds warbling about him. Such a high degree of excellence cannot be achieved without the greatest care in the regularity with which our observations are made and in the preparation of notes, guided always by our love for the study.

During migrations we should also note the exact locality where first appearance was made, conditions of weather, temperature, etc. At all times the kinds and quantities of food taken, that we may determine the utility of the different species and protect them from their numerous enemies. Carefully noting everything of importance, all songs and call notes, nesting habits, peculiar movements on foot and wing, and preferences for certain localities, soon we will become so thoroughly acquainted with our feathered friends,

that we will know just where to find them at all times; we will rejoice with them in their joys and sympathize with them in their sorrows; then will they whisper strange secrets in our listening ears and every chirping or rustling sound will reveal a hidden meaning.

HINTS AT THE KINSHIP AND HISTORY OF BIRDS, AS SHOWN BY THEIR EGGS.

BY JAMES NEWTON BASKETT, MEXICO, MO.

In an attempt at an artificial analysis of the nests and eggs of North American birds, recently undertaken and not yet completed, I have been frequently impressed with resemblances between the eggs of groups often far removed from each other. Of course many of these resemblances were permanent, and, in all probability, purely accidental; but those sudden variations which are so frequently found in the eggs of one species or individual were suggestive. They seemed to hint at a struggle in the egg itself to typify an ancestry or show a progression, and to shadow a complexity of origin and tendency, not always shown by the bird itself.

I had begun to make a few notes on the subject; and when the Executive Committee of this Congress asked me to read a paper on a topic of my own choosing it occurred to me that matter enough might be on hand to justify expanding. I had no literature bearing directly on the subject—in fact I was ignorant of its bibliography; and when circumstances developed which deprived me of the time to complete my own notes, I felt indeed in a dilemma.

I had noted that our common Grackles, or Crow Blackbirds (*Quiscalus quiscula*), laid two very distinct types of eggs, and that while one of them was clearly the egg of a near relative of the Orioles (*Icterinæ*), the other just as clearly indicated a corvine kinship. When we recall how

the Grackles "grade toward the Crows," as Dr. Coues has it, you may form an idea of what first aroused me. Again, within this same group is the Rusty Blackbird (*Scolecophagus carolinus*), with its sometimes scrawled, but often unscrawled egg, and its young with the breast streaked—hinting at a loose or at least a recent position. Here, too, is the Cowbird (*Molothrus ater*) and Bobolink (*Dolichonyx oryzivorus*), each with distinctly sparrow-like eggs—and sparrow-like characteristics generally, for that matter.

The eggs of the Cardinal (*Cardinalis cardinalis*) also varied so extensively, resembling the eggs of some other birds so strongly in both of their manifestations, that it occurred that here too might be hinted a double kinship. Certainly the coincidence mentioned by Dr. Coues of the close resemblance of its egg to that of the Night-hawk (*Chordeiles virginianus*) is purely a matter of chance; but the similarity of the other form to the eggs of the other grosbeaked *Fringillidæ* and the Tanagers (*Tanagridæ*) is more than correlated by resemblances in the birds themselves. I have noticed that the kinship of a series of groups or genera is often thus indicated—if not always consecutively, at least with noticeable outcroppings here and there. It is generally admitted that a close affinity exists between the Owls (*Strigidæ*) and the old group of *Picariæ*, and the resemblance of the eggs in color, texture, etc., running through the Parrots, Cuckoos, Kingfishers, Swifts, and others, is at least suggestive. The Owls are said to shade toward the *Picariæ* through the Goatsuckers (*Caprimulgidæ*), and whether the white eggs of some of the latter typify the vestiges of the kinship may be one of the questions under suggestion.

Few birds' eggs are more variable than those of the Hawks —especially in the genus *Buteo*. Coming out from among the *Herodiones* by the way of the Secretary Bird (*Serpentarius secretarius*), we would naturally expect reversions in that direction. The grounds of Hawks' eggs are largely bluish or

bluish-green in varying intensities, and these are the normal tints among the Heron-forms, whose eggs are unmarked usually. In their markings Hawks' eggs more nearly resemble the Cranes', which are boldly dashed with blackish or reddish brown and purplish dottings. Among the Crane-forms is found also a bird with evident Hawk-like shape and habits—justifying the oölogical suggestion. This is perhaps more evident through the ground-building Vultures, which certainly furnish at least one strain that comes into the Hawks and Eagles.

In these higher accipitrine forms the color of the markings is much lighter, as if diluted, and a very strong tendency is shown toward omitting it altogether. Many perfectly unmarked eggs and even whole clutches are found among birds that usually lay marked eggs. The Bald Eagle (*Haliæëtus Leucocephalus*) lays white eggs; the Golden Eagle (*Aquila chrysaëtos*), usually one egg marked and one unmarked; and the most extravagant variations prevail generally throughout the group, superinduced, doubtless, by comparatively recent changes in nesting.

The Caracaras (*Polyborus*) lay extravagantly marked eggs, frequently having the whole stained deeply, indicating their vulturine kinship; but their great variations show a tendency to struggle upward to the higher birds of prey which the birds' other habits scarcely endorse.

Of course the eggs of different species may distinguish them readily. Swainson's Warbler (*Helinaia swainsoni*), the Short-billed Marsh Wren (*Cistothorus stellaris*), the Arizona Jay (*Aphelocoma sieberi arizonæ*), *Junco phæonotus palliatus*, and many others, are peculiar in their groups for laying white eggs. This is doubtless a recent change. In one genus of flycatchers (*Empidonax*) the species *have to be* diagnosed by nest and egg; and in other instances, as is well-known in the case of Gulls and Plovers, the relationship was first suggested by similarity of egg-markings. The marked differences between the eggs of the black and brown

Towhees well justify the tendency of Prof. Baird and others to assign distinct generic names to each group. The resemblance between the eggs of some Wrens and some Thrashers is more striking than the external resemblances between the birds.

It is not claimed, however, that any of this testimony is more than collateral or slightly confirmatory, nor that definite diagnoses can be based on egg-resemblances; but that the many complex sources from which some of our groups have sprung, can in many instances—sometimes in the clutch of an individual—be perceived in the eggs; that great variations in markings, shape, texture, and tint, often indicate either or both a variety of kinships or a multiplicity of routes up through which either the bird or the egg has come. The subject is full of uncertainties and difficulties, because of the extent of these relationships and their consequent intricacies. From the standpoint of the bird alone our avifauna is a stock of remnants, a chain with many "missing links," a series of survivals full of reversions as well as developments; so that it is doubtful if any scale can ever be drawn that will represent true relationships. The writer undertook one once for a class before which he was lecturing; but he was younger then than he is now. By taking the morphology of any group of organs the thing may be approximated; but on that line only, for a high development of one organ does not imply a high development of others. So when the sternum leads one way, the vomer another, the feet a third, the beak a fourth, the pattern of the feathering a fifth, and altricial and precocial relations a sixth, with naked or downy young when hatched hinting a seventh, leg-muscles an eighth, toe-tendons a ninth, and all the shaping of parts by adaptation and its concomitants, the tendencies of habit and inheritance, hint others *ad infinitum*, the way is far from clear; and if oölogy can shed the faintest glimmer upon the dim trail it should not be despised.

Dependent on some of these, independent of others, and

correlated with a few, comes in the egg—modified perhaps as much by the bird's habits as by anything else—the most variable of the variables—swayed this way and that within an extremely limited range of variations, progressions and reversions in both the bird and itself, and tied down often by a heredity so purely physiological as to be beyond the reach of all the external influences of such environments as often make the bird a new creature. If Mr. Wallace's views be correct—and within limits they seem to be—the egg may be influenced by habits of the parent that have been brought about independent of the needs of the egg. By either his view or that of Darwin, the color of the bird, either male or female, which has been superinduced by sexual or protective selection—an influence clearly outside of the egg's development or adaptation—may so shape the nest as to render the color of the egg and its surroundings entirely incongruous. The influence of migration will be noticed further on. This much has been said in order to show with what encumbrances the egg enters the field. Habit is its greatest foe—a giant towering away above structure or morphological variation. Habit is more flexible than heredity or than the fixing of variations through adaptation to environment. Much as we may sneer at the old systems, more of our modern taxonomy is based on habit than we might be willing to admit. We still group for instance the Owls in the *Raptores*. Perhaps we cannot do better; but quite likely all that holds them there is their specialization as prey-takers—an adaptation wrought by environment upon an altogether different class of material from that in the rest of the group. Their eggs, by the way, strongly hint this. So since we now feel that so much of adaptation is the result of persistent habit, and that adaptation is so large a factor in structure, we might well correlate habit along with structure, at least as a differentiating characteristic—if not an element. Every new habit should distinguish a bird; for, allowing for the tendencies of heredity, and the probability

of the habit being hurtful, it will in time influence morphological structure. As it now stands, the *Raptores* may be, except in extent, a group nearly as artificial as the old *Natatores*.

It would be interesting, if space allowed, to mention a few of the other influences that have affected eggs. As already hinted, aside from shape and shell, the embryonic history of the egg is very limited. The bird inherits it from the saurian hard-shelled, with little left to modify but shape and color. The swing of variations in this is small —especially in the shape; and much as eggs differ in color, it will readily be noted that the differences are wrought with small variety of material. It is more a permutation than anything else. On these permutations specialization has seized, in keeping with the modifying demands of color-protection, parental safety, reversions, and what, perhaps, Mr. Wallace has suggested as unlicensed variation, not influenced by anything. In such groups as the old *Picariæ* the egg has perhaps stood still near to its saurian type, or else gone a round of reversions that have brought it back. Should this latter be the case, what a pedigree of bloods, or map of life-routes, a plain, untinted, unmasked egg might be! Through this old group the beak has ranged from the saurian shape of the parrots to the highly specialized tool of the woodpeckers, and the toes have gone from simple reversions and groupings in pairs to permanent solderings and degenerations in loss of joints. Evidently these adhesions are in no way connected with primary swimming membranes. If the eggs have simply remained white, there is nowhere among birds a better illustration of specialization remaining dormant in them while it ran rampant in structure and habit.

Primarily the eggs of birds must have been white, from the inherent color of the salts of lime and magnesia of the shell. At least this must have been the case with the eggs of the reptiles. As their eggs were buried out of sight there was no demand for significant coloration.

It is possible, therefore, that birds may have themselves developed significant colors, protective and sexual, while the egg was yet untinted.

Unfortunately for us there are no fossil colors; but the development of the egg in the oviduct hints embryologically that color is comparatively a rather recent acquisition in the history of the egg. Far up in the oviduct, where the shell has just begun to form, the most boldly marked eggs are usually plain white, and the intenser colors are laid on last. The fact that young birds as a rule are said to lay paler eggs than the older ones indicates the same thing. There are colored eggs found among all groups of the lowest known birds now living, but these are comparatively young.

The shell structure, egg shape and even the tint of yelk, as well as the surface color show traces of the various strains of kinship that come into it, as shown by hybrid eggs; and the usually much less distinctly marked shells of unfertilized eggs show the very potent varying influence of the male here as elsewhere.

The growth of the egg in the oviduct would seem to indicate that the first change from being white was a solid tinting of the whole surface.

While among the low birds now a pinkish or reddish brown ground-color generally prevails (with exceptions), perhaps taking them all in all some shade of blue or green, or their combination, seems to have been the primary color. Since, however, shell-formation must be a highly congestive process, and since egg-stains seem so closely connected with blood-pigments, it would seem not improbable that pinkish or diluted blood-stains may have been the beginning of color. In this connection it is interesting to note that in some of the Megapodes (or Brush Turkey family), whose nesting is by burial either in the ground or in a mound—approaching very closely that of the crocodile—the eggs are a brickish-red often. If this form of nesting is primary, here is color before exposure—color it may be as an incident or accident

of egg-formation. But, so far as known, no reptile exhibits anything like it, so that color in birds' eggs is likely significant, and this form of nesting may be a degeneration.

The greens and blues noted accord well with living vegetation. Perhaps their persistence now as the basis of modern ground-colors is due to the persistence of chlorophyl. The leaf is older than the egg. At least they seem now to be the only colors inherently or deeply involved *within* the shell, and they show evidences of being the basis of the deepest or earliest spotting. Perhaps the first divergence from sand-nesting and the first step toward incubation was by placing the eggs upon growing vegetation; and the browns may have come in later, as indicated in their usually being more superficial (whether as spots or continuous coloring), and typify a time when dead grass became the nest-material. This was an era of progress, perhaps, for dead grass means after separation from its root, and thus hints at nest-building on the part of the parent.

The browns are perhaps founded in the solid suffusions of the creams and buffs so frequently yet seen in our grounds; and are doubtless held there yet by the persistence of the old superinducing influence of the strawy color of ripened vegetation so much used in nest-structure.

That the blues are very basic is found in another fact, that in some eggs they pervade the shell to the interior in great intensity. In a broken egg of the Turkey Vulture (*Cathartes aura*) in my collection, many spots that are faint lilac externally show on the inside as a deep indigo blue, while the pale browns are not visible at all from beneath except by transmitted light. In the egg of a Bartram's Sandpiper (*Bartramia longicauda*) there are faint brown spots on the outside which have no internal showing, and faint bluish spots inside that do not show at all outwardly, even in the unmarked places. To my mind the suggestion comes that many of our early birds with spotted eggs may have reverted from green and dead grass nesting to shingly or

brilliant pebbly regions, carrying with them the bluish, greenish, creamy or drab grounds, and by that tendency to variation for which we can never account—a thing as mysterious as life itself—they here, through the agency of natural selection, began a mottled color-adaptation which has developed so highly in our shore birds, Gulls and their relations.

Among the tree-builders, Mr. Wallace has suggested that the mottling might be produced by the same sort of imitation of the light and shadow spots, caused by the sun's rays being strained through the foliage. But this seems too uncertain to satisfy us. With the egg coloration developed from the other way, we can see how this might slightly intensify the already inherited tendency of spotting and modify the tints. This view would tend to account for the blue and green grounds persisting. I am inclined to feel, however, that the basis of many highly spotted eggs of tree-builders is purely hereditary. I cannot see, for instance, how natural selection could get hold of the wreath around the large end of so many high grade eggs. It must be the remains of a reversion.

Perhaps no group of birds are akin to so many others, either by progression or retrogression, as the *Limicolæ*. That they were closely connected to the Gulls I found out in an attempt to differentiate their eggs and nidification by mere descriptions independent of the birds, long before I had noted that this relationship had been asserted of their structure. If, as held by some, the *Alcidæ* (Auks, Murres, Puffins, etc.) are degenerated from the *Limicolæ*, through the Gulls (*Laridæ*) we may readily see why the eggs of so many *Alcidæ* are so heavily marked, though deposited *now* in burrows. Here, it would seem, a circuitous route to a concealed nest is fairly indicated; for if these eggs had gone directly from beneath the sand to a burrow they might have remained white.

Among the Birds of Prey, the markings as noted are quite probably an inheritance from the ground-building habits of

the Vulture branch of the family; but now that they nest so largely in trees and protect their eggs so vigorously, there is a strong tendency in them all to lose their markings.

In the cases of such small birds as lay white eggs in elevated exposed nests, many of them have quite probably been builders of concealed nests, or else their nests as now situated (as suggested by Mr. Wallace) are less exposed than may casually appear. Some have so recently taken to trees and the consequent exposure as not to have had time to develop a colored or protected egg. Others, perhaps, are so secure now on account of some other circumstances, that the tendency to reversion comes strongly in. For instance it is evident, from the broken-wing hypocrisy act, that our common Dove (*Zenaidura macrura*) was primarily a ground-builder; and I may note here that while it used trees mostly, thirty years ago in my region, it is now chiefly nesting on the ground in oats, stubbles, and under weeds, and sometimes under tufts in pastures, thus showing a tendency to conceal the nest. It is said to build in trees exclusively in Jamaica since the introduction of the mongoose, though formerly a ground-builder there. There is much to show that our common Bluebird (*Sialia sialis*) has only recently become a hole-builder, but its occasional white egg hints, in keeping with the habit, at a reversionary tendency that may one day make its egg unique among the clan of Thrushes, the eggs of which are now so constant in their coloration. I have here to record, however, that a nest of this bird has been recently found by a trustworthy naturalist, Professor Kilpatrick, of Central College, Mo., in a standing clump of weeds, with whose foliage of course the bluish-green egg well accorded. The bird may yet preserve its colored egg by a reversion to its primitive nesting habit.

I have spoken much of the tendency to reversion in eggs. I am inclined to regard these reversions largely as ancient rather than modern, though some instances of recent reversions will be mentioned later. Nest location and structure,

as we have seen, were doubtless much later than egg deposition, and it is hardly denied that these have done more to influence egg coloration than anything else. Now to-day it is known that few things are more variable than styles of modification. Climate and environment often entirely revolutionize building habits, not to notice the factor of variation here as elsewhere. Herein we face the full force of migration on our subject, and halt in the presence of the fact that physiological trends and habits that affect the egg, both in time past and present, were set up in a far northern climate, in an environment now entirely changed and forever beyond our knowledge. The modern birds have come out of an unknown region, bringing with them their desire to get back—and their eggs marked to suit the foreign surroundings. We must feel that they have left behind many interesting phases of their original modification. The bird which in the arctics long ago may have lined its nest with green moss or gray lichens may now floor it with flax in Dakota, or pad it with cotton in Texas; and yet in either deposit a solid green or mottled grayish egg in keeping with the colors of "the old house at home." So now unlimited tendencies to reversion may set back.

With regard to modern reversions the occasional white egg now and then found, or entire white sets as noted among the Hawk-forms may be a kind of albinism or abnormal deficiency of color; but this is not always necessarily the case.

It is well known that a bloom or chalky deposit characterizes the eggs of many water birds—especially Grebes and Cormorants, some Grouse, and noticeably the Cuckoos. While it happens upon eggs of birds far apart it may in some measure indicate kinship. The *Coccygomorphæ* or Cuckoos and *Gallinæ* or Fowl groups are akin, according to Prof. Huxley. But the peculiarity is most striking in the Pelican-forms—whose affinities to other water birds are apparent only to the anatomist. But this roughness of the shell is

shared by some Heron-forms and by Flamingoes, to which groups the Pelican-forms are evidently akin.

But my purpose in noting this chalky incrustation was not to emphasize the affinities. It is supposed to indicate an incompleteness in the structure of the shell—from what cause we can only guess. But so far as I know it is invariably white, and often deposited over a sub-surface that is colored. Now while it is incomplete it is the latest deposit, and having no color in it, it shows a tendency toward loss in color—a reversion, as if the bird now was trying to lay a white egg. The Cuckoo's egg also fades rapidly upon exposure.

On the contrary some of color modification in eggs must be progressive, and of course recent. In some of the Ptarmigans (*Lagopus*) the pigment has over it no shell structure whatever. The deposition is so recent and superficial that it may be rubbed off when freshly laid, and the primary tint beneath is very like that of some sister Grouse that do not lay a highly marked egg. Here, then, is an egg that seems to be changing to suit its present environment; and a glance at it will strongly impress any one that its modern coloring is in keeping with the dead-leaf nest-lining now used by the bird. The eggs of the Canada Grouse (*Dendragapus canadensis*) show marked similarity to those of the Ptarmigans, and the eggs of the others grade on down to very faint dots over a creamy or dirty ground, so usually characteristic of the Fowl group.

The shape or direction of some egg-markings seem to indicate the progress of the egg through the oviduct. A change, therefore, in the style of an egg involves a great deal. Other eggs, however, seem, judging from the sharpness of the outlines, to depend upon the peculiar shape of the depositing surface. Both are dependent upon the quantity and intensity of the staining secretion.

However this may be it is well known that, variable as they are, there is no better diagnostic feature than the style of these markings. If they be the result of motion, that motion

is so variable as to come within no known canon of generalization, for in some cases it seems often reversed, and there are, at times, evidences of complete end for end turning of the egg. If it be a matter of gland-shape, a constancy of physiological structure ought to prevail, which is not justified by the various styles of eggs found in a single clutch. If it were this, all eggs from the same bird, at least, should be alike, or if the markings were made by motion past glands of constant dimensions, or outlines, the paths past these glands should have a constant width in accord with the direction.

It would seem, therefore, that any part of the oviducal surface within which the color is laid on is capable, under certain unknown stimulus, of depositing intense color—more of the surface at one time, less of it at another. There are doubtless times, as shown by solid brownish-colored eggs, when the whole surface at once dyes the egg, which was quite probably the case originally. As a rule this law holds now, that the more variable are the markings, either in shape or color, and the more extensive in boldness and number, the more variable are the tints of the ground; showing clearly that the whole coloring system, from the most remote to the most recent, has been thrown into a spasm of variations; and that spottings originally came in by the breaking up—doubtless often under reverting tendencies—of the bluish and brown grounds along with such others as they may have combined to produce. The fact that there are some deep dark spots on the inside of some eggs may mean that they are vestiges of a round of variations that the shell tints themselves may have undergone long before they began breaking up into specks, spots and blotches. Motion must be an element of blotching, but the faintness and intensity of these markings varying so much in the same bird, along with the variations in their shape, size and number, show clearly that it largely depends upon stimulation, and sometimes, it would even appear, upon the limitations of the supply of pigment.

Just what this stimulant is we may never know. That it is dependent in some measure on food is probable, and that climate affects egg-colors is certain; but in what way is the question. The coloring matter has been thought to be closely connected with the waste products or coloring of the blood and bile. In the one case the bird may be putting on ashes for beauty merely, and in the other she may be like the rest of us—stimulated into her best work or hampered into her worst by the "condition of her liver."

Perhaps it is scarcely necessary to say that there is no relation between the color of a bird's plumage and its eggs. The Peacock and the Humming-bird in all their gaudiness lay plain white eggs.

A few thoughts now about shape and I am done. Naturally, if left to itself, the shape of the egg would be globular, because before the shell is hardened it is fluid. In the reptiles it is said always to be globular or ellipsoidal. The last condition is doubtless brought about by compression; and in some serpents, perhaps on account of close quarters, the shape is much elongated.

Birds inherited these shapes from the reptiles. In many of them the globular and the ellipsoidal shapes yet prevail —especially in the lower forms. But in most birds there is a distinct ovoid shape, with one end smaller than the other.

We know not what has brought about the various forms in birds' eggs, but the impression is strong that the ovoid shape is in some way connected with incubation and possibly with upright or bipedal posture. The best illustration with regard to its correlations with incubation is seen in some of the narrow-breasted Plover-forms, where the number of eggs is usually three, or oftener four, with very sharp points at one end; and they are found in the nest with the points toward the centre. It is of record that if disarranged the bird turns the points all inward before "going on" again.

In some Gulls similar eggs are found on one side of this

group; and in some Partridges, on the other. In our Bob White the eggs are usually quite pyriform (as these sharply-pointed eggs are called). Here the clutch is large and the eggs often lie in two layers. It is possibly a convenience to have the pointed eggs of one layer project into the interstices of the other, and here also they lie closer together. When it comes to so small a bird covering as many as thirty-six eggs, economy of space is an item. The Prairie Chicken (*Tympamuchus americanus*) lays also a fairly large clutch, but it is strikingly my experience that she does not hatch out nearly so large a percentage of her clutch as does the Partridge (*Colinus virginianus*).

The Auk-forms—some of them—lay a *single* very pyriform egg, and being broad-breasted have no need of this shape to make incubation easy. It is well known, however, that it is claimed that this shape is maintained to prevent their egg from rolling off the bare rock upon which it is sometimes deposited. It is rather remarkable also that such *Alcidæ* as nest thus outside of burrows have the more unequal-ended eggs, as if designed to roll around in a circle.

Recalling the fact mentioned that the upright postures may tend to make the lower end of the egg larger by gravity, we can see how a double selection action might come in here. Thus the most upright bird laid the most pear-shaped egg; the most pyriform egg is the least liable to roll off and be broken, and a more upright-sitting and pyriform-laying strain would thus come about, till the poor bird would almost stand on the tail. I do not assert that our *Pygopodes* have come about in this way, nor that the theory accounts for the jamming up of the "twenty-odd" vertebræ in the tails of the successors of the *Archæopteryx*.

The Pigeons, with usually horizontal bodies, lay very ellipsoidal eggs, but the Sand Grouse (*Pterocletes*), which are the connecting link between these and the fowl-forms, lay an extravagantly elongate, equal-ended egg, and are terrestrial and Plover-like in nesting, in the number of eggs, and

their manner of spotting. On the other side of the Fowl-forms (in which we find the partridges), in fact on the aquatic side of both Fowls and Plovers, are the Grebes with an equal-ended, doubly-sharpened egg. So the center of evolution for peculiar egg-shapes must lie in this region, in some cases these are probably the result of an immediate need, and in others the effect of inheritance. There are other phases of the subject for which space is not at hand. To all views there are striking and perhaps fatal objections—especially to that of posture. The Woodpeckers and Owls are notoriously upright—both even roosting that way; yet they lay the most globular of eggs.

Of course there are many intermediate shapes, all of which may be characteristic of families or other groups, but in species these are especially helpful in diagnosis, being often more permanent than color or markings.

Likewise the sizes, though quite variable, have a range for each bird, and the proportion between the long and short diameter—a factor of shape—is a characteristic feature, though it too is variable and has less room for play than other characters. One dimension is usually two-thirds or three-fourths of the other, except in globular eggs.

In thinking over my paper I feel that I have been far from consecutive, perhaps often far from consistent, and I fear at times too digressive—certainly too diffusive and speculative. But the paper is designed as suggestive rather than argumentative, and is but the crude expression of unformulated ideas on the subject. To me it seems an intensely interesting branch of ornithology yet largely unexplored; and while "by no means an exact science," as Dr. Coues phrases it, its study must have its rewards.

THE RED-SHOULDERED HAWK IN CAPTIVITY.

BY H. C. OBERHOLSER, WASHINGTON, D. C.

THAT many of the various species of Raptorial birds may be successfully reared in confinement has been, by numerous experiments, amply demonstrated. While it is of course true that all birds, by adaptation to the circumstances of their imprisonment, alter to a greater or less extent certain of their natural habits, yet the advantages accruing to the naturalist through rearing birds, especially the rapacious species, in captivity, are too obvious to require either explanation or enumeration. Aside from the value of direct observations upon the habits of birds in confinement, is the comparison of traits modified by such abnormal conditions, with those known to exist in a state of nature. The observation of food habits is of much importance, although the results obtained from captive birds must be considered in a measure negative; since their altered environment induces different discrimination in regard to the acceptance or rejection of certain elements of their available food-supply. It is, however, the comparison of these differences which gives to experiments of this character much of their value and interest.

One of the easiest of the *Raptores* to rear in confinement is the Red-shouldered Hawk (*Buteo lineatus*), for under favorable circumstances it readily adapts itself to the society of man. When brought up as a pet it may be allowed comparative freedom, sometimes becoming much attached to its owner, as may be inferred from the following extract taken from Dr. A. K. Fisher's excellent monograph of

the Hawks and Owls of the United States, and which is here quoted for the benefit of any who may not have had the pleasure of reading the original. He says: "The writer once reared, and kept for a year or more, one which was taken from a nest when only a few days old. It finally had to be killed because of its fierceness toward strangers, although it was never vicious towards its owner. When no other person was present it would alight on its owner's shoulder, and show signs of contentment and pleasure by uttering a low musical note, and by caresses, which consisted in gently passing his ear or a lock of his hair between its bill very much as it did its own feathers in the act of pluming itself." The great variety of food accepted by this species renders easy the provision for that portion of its needs in captivity. Dr. Fisher in the above mentioned treatise names representatives of eleven distinct classes of animal life, which have been taken from stomachs of the Red-shouldered Hawk.

On May 26, 1887, a friend of the writer became the possessor of a young nestling of this species. Though only a few days' old its appetite was of most voracious description; for shortly after its capture a quantity of raw beef fed in small pieces was devoured with evident relish. Kept in a yard in town it soon became accustomed to its surroundings, and grew rapidly to maturity. Its food consisted of fresh meat of any kind, rats, mice, birds, etc.; but the quantity daily consumed became very moderate, a single bird about the size of a Sparrow, or its equivalent in other meat, being usually sufficient. Flesh of any description boiled or otherwise cooked, of course with salt, was to all appearances eaten as readily as though fresh, and formed not an inconsiderable element of its diet. It drank water freely, although generally only about once a day. Under ordinary circumstances it would not trouble the poultry, with which it came, however, daily in contact; but occasionally, when it chanced to be unusually pressed by hunger, the young

chickens proved too strong a temptation. With the dogs and cats of the neighborhood it appeared to be on very good terms, and to be not in the least afraid of them. Although unconfined it never attempted extensive flights, seeming to have no such inclination, beyond short excursions into the neighboring yards, from which it always before dark returned to its perch. In moving about the yard it usually hopped upon the ground, at times making use of its wings to facilitate its movements. One day a boy wearing black hose visited the yard, and in passing the Hawk gave it a thoughtless kick. It subsequently never seemed to have forgotten the association of this insult with the black stockings, for if ever on its perch in the back of the yard as the boys passed on their way home from school, it would watch intently until one wearing black hosiery came along, when, raising itself to its full height, it would scream incessantly until the cause of disturbance had passed out of sight. So long as the boy remained outside the fence no molestation was attempted, but woe to any youngster wearing the offending article of apparel who ventured into the yard. The Hawk, seeming to consider such a one the perpetrator of the original offense, would immediately jump from its perch, half hop, half fly across the lawn, and though under ordinary circumstances not at all ugly to strangers, would without hesitation fasten itself with beak and talons upon the intruder. So vicious were these attacks that considerable force was usually necessary before it could be dislodged. When full grown this bird was taken to the country and there allowed the freedom of the farm. It finally, however, became so restless as to necessitate the clipping of its wings, and also soon afterward, its almost continuous confinement. It moreover gradually became fierce toward strangers, and if it happened to have been recently annoyed, sometimes manifested its ill temper even toward its owner. On the 18th of February, 1890, it escaped and wandered off, walking upon the top rail of a fence for nearly a quarter of a mile, finally disap-

pearing into the woods. Six days later it was found dead, having, as was afterward ascertained, been mistaken for a wild hawk and killed with a cane.

On the 18th of June, 1892, the writer, through the kindness of friends, procured three young Red-shouldered Hawks, which had been taken from a nest in the northern part of Wayne County, Ohio. The nest was difficult of access, and the birds were obtained by pushing them from the nest with a long pole. This was a tedious operation, for the birds very strongly objected to such an unceremonious proceeding. The cries of the young attracted the attention of the parent Hawks, but as is usually the case they offered no resistance, merely flying about overhead or perching upon the neighboring trees, giving utterance to their displeasure in frequent screams. The young birds when first brought home were temporarily provided for in a small box in the woodshed, but finding these quarters too cramped, they were removed to an unused poultry house, and there placed in an empty dry-goods case, the front of which was vertically barred with slats. A single perch was nailed lengthwise about the center of the box, and on this the birds subsequently spent the greater portion of their time. In lieu of anything better the floor of this extemporized cage was covered with a quantity of excelsior packing. Owing to a fractured wing caused by the fall from the nest, it became necessary on the third day of their confinement to kill one of the birds. Although about four weeks old when taken from the nest they refused to eat anything during the first day and a half, except what was forced into their mouths. By a little perseverance, however, they were soon induced to take small pieces of raw beef from the fingers or from the end of a small stick. The wing-broken bird was the first to thus accept food. They very soon learned to pick up the pieces of meat from the floor of the cage, and at the same time refused to be fed with the stick, to all appearances becoming afraid of it. When they grew older, nothing seemed to

give more annoyance than a stick thrust toward them, for they would at once commence to rush back and forth from one end of the cage to the other, screaming loudly all the while.

For the first three or four days of their captivity they remained very quiet and subdued, but finally, having become somewhat accustomed to confinement, they seemed possessed of a continual desire to escape from the cage, and to this end apparently employed most of their time during the day. Every loose slat was opportunity for an exit, and at first, the cage having been rather hurriedly constructed, to find at feeding time both the birds perched serenely on its top was an almost daily occurrence. This was at last prevented by fastening the slats very much more securely, and at intervals of less than two inches.

These Hawks very promptly resented any familiarity, and whether in or out of the cage, resisted most vigorously any attempt at catching them. Upon such occasion they would run into the nearest corner, throw themselves backward, strike with their feet at anything that came near, and upon being caught nip savagely at hands or clothing. Notwithstanding their evident dislike to such close confinement, they to all appearances thrived well, increasing rapidly in size. At the age of six weeks a substantial difference in the pair was apparent, the female being readily distinguished by larger size as well as much greater boldness in all her movements. They seemed to possess a special antipathy toward dogs, for whenever one of these animals approached the cage they exhibited evidences of unmistakable fear and rage, rushing to and fro in the greatest excitement imaginable. Toward all persons who came near they appeared equally fierce, even to their owner being by no means entirely reconciled, although they knew him and at once raised a clamor for food. At these times the male was much less demonstrative than the female, often even sitting quietly on his perch, to all appearances unconcerned at the excitement of the other.

Raw beef and veal formed the principal element of their diet, but animal food of any description was readily accepted. Birds given them were eaten piecemeal and devoured, all but a few of the larger feathers. They much preferred fresh to stale meat, and took the latter only when pressed by hunger. But the skinned carcasses of two Killdeers, a Rose-breasted Grosbeak and a Scarlet Tanager, which were in an advanced stage of decomposition, were eaten without hesitation. Vegetable food of all kinds was invariably refused. If fat adhered in any considerable quantity to the beef given them, they carefully removed all the flesh and left the fat uneaten, though to a small amount they took no exception. Except when unusually hungry they disliked being observed while eating, and much careful manœuvering was often necessary to obtain opportunity to watch them while thus engaged. They were fed usually every day, four or five ounces of flesh constituting their ordinary rations. Sometimes, however, they happened to miss their daily meal, a neglect which they always resented by loud cries, continued throughout much of the day. A two or three days' fast, however, did not seem to cause them inconvenience, neither to much affect their appetites, for they were at all times great gourmands, never allowing anything edible to remain two hours in the cage unconsumed. Their food was given in comparatively large pieces, which holding sometimes with one foot, sometimes with both, they would tear and devour. Their actions while thus engaged were at times quite ludicrous, for occasionally by underestimation of their own strength, or a miscalculation of the toughness of the meat, their efforts would end in a most unceremonious tumble.

Sometimes, too, both of the Hawks would struggle for possession of the same morsel; wings, tails and claws being brought into requisition until either it was divided or the male gave up his hold; for these encounters nearly always resulted in favor of the female, either by reason of her own

superior strength or a lack of spirit on the part of the other. In fact the male would often at feeding time wait quietly on his perch until the female had satisfied her hunger, before venturing himself to manifest even any desire for food. Although water was several times placed in the cage, both refused to either drink or bathe.

The anticipation of a prolonged absence from home caused the final necessity for disposing of the captives, and they were accordingly sacrificed to science on the second of August, after a confinement of about two and one half months. When killed they were both in healthy condition; quite fat and very free from vermin, none being found upon the female, and upon the other, only a single specimen of a common parasite of *Buteo lineatus*, the *Docophorus buteonis* of Packard.

The birds, for several days previous to their death, had been maintained on short rations, and had not been fed since noon of the day before. Of this food not a vestige had remained in the cage at seven P.M., yet at nine o'clock the next morning, when the lives of the captives were taken, the stomach of one of the birds (the female) was filled with partially digested beef. Thus at the very least calculation this food had remained fourteen hours in the stomach unassimilated; which circumstance, in view of the exceedingly rapid digestion of the *Raptores*, seems somewhat remarkable. The stomach of this bird contained also a few pieces of the excelsior packing with which the floor of the cage had been covered. The stomach of the other contained no food, but was distended to its utmost capacity by a compact mass of excelsior. That this excelsior had been taken into the stomach by adhering to the bird's food would seem to be the most plausible explanation of its presence. It might, however, be interesting to have determined whether or not the Red-shouldered Hawk, like many other species of rapacious birds, would have disposed of this indigestible substance by ejection through the œsophagus.

ON THE CHANGE OF HABITS OF SOME MAINE BIRDS.

BY MANLY HARDY, BREWER, MAINE.

WITHIN the last fifty years many kinds of birds, in Maine, have not only changed their places of nesting, but in some cases have also changed their style of building. One species, at least, has abandoned several kinds of food which used to form a part of its usual diet. These changes have been produced by various causes, among which the following are some of the principal: Change of place of nesting has been caused partly for greater ease in securing food, and partly to avoid enemies. Change in the form of nests has followed change of place, from the necessity incident to difference of surroundings. Change of food has been due to persecution by man, so that the usual food cannot be obtained except at too great risk. The Juncos, which usually choose to nest at a considerable altitude, to obtain the coolness they enjoy, have found that they can obtain the desired temperature in ice-houses, and their nests may often be found there. Night-hawks, which formerly laid eggs on the ground or upon rocks, now avail themselves of flat, graveled roofs of buildings in the vicinity of cities, while their country relatives remain unchanged in habits. Golden-wings formerly nested only in holes in trees; but as the trees disappear they often make holes in the finish under the eaves of buildings. Robins, whose nests formerly were mostly found in trees, and which still build in them in sparsely-settled regions, in the vicinity of towns build largely under the returns of houses, in the

ends of board-wood and bark piles, and in fences. Where unmolested they learn to follow people hoeing in gardens, and pick up the worms just as chickens do; and where sprinklers are used on lawns, may often be seen directly under the falling drops, seeking for the worms which they have learned come to the surface for the moisture, as they do in rain-storms. Of late years, all along our coast, Fish-hawks, which formerly always nested in trees, have been forced by the trees in many places either being cut or blown down, to find other nesting sites, or abandon their old fishing-grounds. Some now build on roots of upturned trees; some on the ground; others on rocks; and I saw one pair building on the top of a derrick near an abandoned marble quarry. In some of these cases the material for building was changed, no sticks being used. One nest was composed wholly of kelp and sea-weed, and another of cedar bark. Formerly, Herring Gulls nested on the ground; now many of them along the seacoast nest in trees, while at our large inland lakes they build wholly on the ledges as formerly, making their nests of moss and grass. The reason of the change in their case is on account of their nests being so persistently robbed on the seashore. Not only the Herring Gulls, but also Bonaparte's Gulls, and Terns, resort to our lakes to nest in larger numbers than formerly. Forty years ago, Ruffed Grouse fed largely on grasshoppers in August and early September. I have seen whole broods chasing them exactly as hens or turkeys do; but although I have examined many hundreds of their crops it has been a great many years since I have seen any trace of their having fed on these insects. This is the more remarkable, as grass-hoppers are the only kind of animal food which I have ever found in the crops of Ruffed Grouse. They formerly resorted to the edges of fields and old roads in the fall to feed on clover leaves, their time for feeding being from four o'clock till dark. Now one is seldom seen doing this, but instead they may often be seen just after sunset, quietly sailing

far out into the open pastures, especially those on hillsides, where they can feed without danger of being surprised. Formerly it was a very common thing to see the old males strut around, dragging their wings and quit-quiting, like Turkeys. Of late years one is seldom seen to do this, and they very rarely make any noise except when flying. Perhaps the greatest changes have taken place among Swallows. Finding that their favorite insect food could be found in greatest abundance near habitations, they have almost entirely abandoned their former building-places, and also in a great measure their habits of building. Blue-backed Swallows, which away from settlements nest in holes in trees and stumps, now nest under eaves of houses and in martin-boxes. Cliff Swallows, which, as their name indicates, formerly built against the sides of cliffs, now so generally build under eaves that they are now often known by the name of Eaves Swallows. Audubon tells us that when he first saw them near Cincinnati, in 1819, they had been there only about four years, having come from the West about 1815. He describes their nests then, as being shaped like a gourd, with the neck turned down, and his plate on page 117 of his first volume is an exact likeness of their nests as I first saw them, over fifty years ago. Mr. E. A. Samuels, as late as 1875, described the nests as being gourd-shaped. "The larger part being attached to the cliff or building, and the neck turning downward and outward, the entrance at the part resembling the neck of the gourd." While his description was correct of the nests as they formerly had been, I think that he copied his description instead of describing the nests from actual observation as they then were, as the birds were already modifying their style of building; but I well remember when every nest was built as he describes, and the old birds used to sit in the hole at the end, which often was wide enough to allow two to sit abreast. Now all this is changed. Instead of the long curved covered way leading to the base, most nests are simply an open structure like half

a cup attached by one side to the building, with no covering whatever. One can easily see the causes which have gradually led the birds to adopt this form. Where they built against cliffs, there was a necessity for covered nests, and the rocks were so damp that the material of the nest kept moist, so that, although from the nests extending so far outward, there was a tendency to separate from the base, the tenacity of the mud prevented it. Building in the same way on the sides of barns, the nests would not adhere to the boards when the weather was dry, and in consequence many nests fell and multitudes of eggs and young were destroyed. Besides, as the eaves of many barns projected so as to protect them, there was less necessity for covered nests. Thus gradually the style has changed, till now few nests are seen near settlements which bear any resemblance to Audubon's plate. Two years ago, I saw a notable exception to this. At the "Giant" farm, near Caribou Lake, we saw these swallows in large numbers building in the old style. This farm is in the woods, ten miles from the next house, and some thirty miles from the nearest settlement. Whether these birds had never been near settlements, and so had not learned the latest improvements, or from whatever cause, they continued to build in the old way.

I might extend this paper by mentioning changes in habits of other species, but sufficient has been said to show that birds, like people, are progressive, and those who observe them closely will yet learn many things of which we are not now aware.

ORNITHOLOGY IN OUR COMMON SCHOOLS.

BY ABRAHAM H. BATES, CHICAGO.

Of all those creatures that we are pleased to call dumb animals, birds are the most vivacious and interesting. Their wisdom instructs; their color and motion charm us; their songs are delightful. If the dappled lily should please, how much more the dappled Thrush with its thrilling song and graceful movement. If the blue violets of spring are charming, how much more the Bluebirds of spring with their caressing song and matchless hue. On the ground of utility, song-birds are not less worthy of consideration; for beauty and song have a value beyond calculation.

As I go through a great forest, scarcely a sound disturbs the stillness save the cry of the boding Owl, or the scream of some diurnal bird of prey; but as I approach the orchard, the garden, the hedgerow, and the shade trees, the air is vocal with the ecstasy of bird music. This means that birds approach man's abode for protection, and in return will amply repay their protectors with song that lasts from break of day till dewy eve.

That our little feathered friends shall be duly understood and appreciated, we must begin by teaching every child something of the nature and value of song-birds. Our state schools have already made a beginning. A few scientific text books have been introduced; and better still, reading lessons by John Burroughs and others. Some of our superintendents and principals have taken the matter in hand. Seeing that ornithology was no part of the course of study, they have prescribed a number of valuable lessons on birds.

Still there remains much to be done. Thousands of school-children, especially those living in our largest cities, do not know the Robin from other Thrushes. The screech of that filthy scavenger, the House Sparrow, and the carol of the Wood Thrush, are all the same to them. In consequence of this ignorance, the boy turned loose from school commits indiscriminate slaughter. A few wholesome lessons on bird-life would result not only in the protection of song-birds, but in the development of nobler and more intelligent young men. This instruction should be given by every teacher in our common schools: at first in popular language readily understood by children in the primary grades, but in the more advanced grades some of the technicalities should be introduced.

Allow me here to name some of the phases of the subject most worthy of the attention of our teachers.

1. The value of the music of our song-birds. What joy, romance and beauty is brought into our lives on the wings of bird-songs!

2. Their value as insect-destroyers. Some naturalists contend that were it not for birds—especially song-birds—our orchards and fields would become almost entirely unproductive.

3. Their forms, colors, motions, habits, and migrations—in a word, their life-histories.

4. Their place in poetry, romance, and folk-lore; legends of the Stork, Dove, Phœnix, and many other birds, in the traditions of ancient and modern nations; the origin and meaning of these legends.

5. The chief enemies of song-birds, namely: Crows, Jays, Hawks, Owls, Shrikes, House Sparrows, rats, snakes, weasels, air-guns, shot-guns, egg-collectors, specimen-hunters, (not the college professor who obtains a special license to gather eggs and collect birds), stupid pot-hunters, and last but not least women with barbarous tastes who wear birds on their hats.

These are a few of the song-birds' enemies that should be pointed out by the faithful teacher. It is the teacher's duty to arouse in our children a healthy and righteous sense of indignation against evil-doers; for children should learn to abhor as well as to love. Some of these enemies should be especially condemned. How many a cruel wretch prowls about as a pretended egg-collector! At his heels comes the specimen-collector, shot-gun in hand and cruelty in his heart. Neither does science demand nor humanity permit the wholesale slaughter and robbery of birds. Next let me mention the House Sparrow, sometimes incorrectly called the English Sparrow. He is an enemy of nearly all our most valuable song-birds. Already the Purple Martin, once numerous, is now almost extinct in some localities. His box, once the centre of song and joyous motion, is now occupied by the screeching scavenger foolishly introduced from the old world, which takes possession of every available nesting-place, and crowds out song-birds that are unable to defend themselves. The proofs of these charges against the House Sparrow are convincing to every unprejudiced mind.

As to the egg-destroying propensity of Jays and Crows, all naturalists agree. The Jay, however, is much the worse of the two, owing to his bold and familiar ways.

Let every school-girl learn how nefarious it is to kill birds for their plumage to be worn as some barbarous chief wears the scalps he captures.

These lessons can be made most interesting and profitable during May and June, when birds may be seen to advantage and when the teacher should take pupils to the groves and fields for the purpose of making observations. The result would be most happy; they all would acquire habits of closer observation and a greater love of the true, the beautiful, and the good. Days spent with birds would be red-letter days, exuberant with beauty and tonic with the ozone of moral, physical and intellectual vigor—days looked forward to with pleasure, and looked back upon with happiest

memories. Such lessons would lead to an intelligent and discriminating regard for things. Some contend that everything was created for some useful purpose—a little girl declaring that mosquitoes were of use, since they "made things lively." Certainly many things seem designed to awaken opposition, and arouse indignation. Such are the venomous reptiles; and, in a milder way, noxious weeds of the field. If in Egypt birds have been worshipped; if in some oriental countries even venomous reptiles have been regarded with awe, we have reached a better era of discrimination. Some living things are to be destroyed—yes, exterminated. It is not cruel, but humane, to destroy venomous serpents, nor does such destruction develop a cruel disposition. If a mother destroys a wild beast that threatens the life of her child, does she on that account think any less of her child? Indeed she thinks still more of her child and all other children as well. If a child rescues her Canary-bird from the attack of a Hawk, does she think any less of song-birds? If a boy slaughters House Sparrows as the common enemy of song-birds, does he thereby become cruel? Quite the contrary; he becomes more merciful and kind toward the objects he seeks to protect.

ABSTRACT OF ADDRESS ON THE BIRDS OF BRITISH GUIANA."

BY J. J. QUELCH, B. SC., C. M. Z. S., CURATOR-IN-CHARGE, BRITISH GUIANA MUSEUM, AND SPECIAL COMMISSIONER FOR BRITISH GUIANA TO THE WORLD'S COLUMBIAN EXPOSITION.

I MUST apologize at the very beginning of my address in that I shall be compelled to make use of many of the technical names of the Guiana birds, though there is this excuse, that while in very many cases their common names would be absolutely meaningless to most of you, their technical names will tell precisely to all ornithologists the nature of the bird denoted. There is this practical defence for what are often called crack-jaw names of animals in common parlance, that whereas the common names will vary with each language and often with slightly different localities, scientific names are the same in all tongues, and in all parts of the world.

A special interest attaches to our Guiana birds, not only on account of the very large number of species, and their astonishing brilliance of plumage, but also on account of the peculiarities of form and structure, by which many distinctive families are characterized. Hardly ten years ago, Osbert Salvin, in the pages of the "Ibis," published a revised hand-list of the birds of British Guiana, and enumerated some 700 species, based as well on the results previously obtained as largely on the work of the noted collector, Henry Whiteley. Quite recently I have been able to extend this list by several dozen species, which, though well

known, had not before been recorded as resident in the locality.

Of our peculiar families, I need only mention such as the Sugar-Creepers, the Greenlets, the Mannikins, the Cotingas, the Trogons, the Toucans, the Barbets, the Hoatzin, the Tinamous, the Curassows, and other equally restricted tropical American forms; while others, such as the Tanagers, the Tree-Creepers, the Ant-Thrushes, the Tyrant-Shrikes, the Humming-birds, the Hang-nests and other such forms, which, though they range into the temperate parts, yet are enormously abundant in the tropics, will occur at once to your minds. It is worth noting in this connection that many of those families, such as the Crows, Starlings, true Shrikes, and true Creepers, which give so many characteristic types to the Northern regions and to the Old World, are almost, if not entirely, absent from the American tropics.

A noteworthy characteristic of our birds also is the very marked abundance of the individuals of a species. This no doubt is due to the protection afforded them by the abundance of trees in the forests and bushy plains, and to the enormous quantity of food in the form of seeds, fruits and insects, with rapid multiplication in an almost uniform and favoring temperature. Very many forms are only to be met with in well-defined districts; thus, the species of such genera as *Cotinga*, *Xipholena*, *Phœnicocercus*, *Gymnocephalus*, *Gymnoderus*, are only encountered in densely forested localities; *Rupicola* only in the hills; *Fluvicola*, *Pitangus*, *Arundinicola*, *Quiscalus* only in open places and along the river sides; while others, such as *Troglodytes* and *Cassicus*, are most abundant in cleared places or in the neighborhood of the habitations of man.

The food relations of many of our birds are also peculiar. A very considerable number of our Hawks, examined at different times of the year, and in different places, have revealed only a diet of moths, beetles, grasshoppers, locusts, leaves and fruit. While just as certainly the genus *Herpe-*

totheres will be found to contain snakes and lizards, and *Rostrhamus* the soft parts, picked out by their long, curved and sharp beaks, from the shells of the apple-snails (*Ampullaria glauca* and *A. amazonica*). The vultures (*Cathartes*), in the forest districts, contain almost invariably a preponderance of fruit and leaves; while *Mycteria*, the giant Stork, seems to prefer, or at any rate is only able to secure, in the depth of the dry and wet seasons, the commonest beetles, grasshoppers and locusts. The most marked diet, however, is that of the Hoatzin (*Opisthocomus cristatus*), which feeds only on the young leaves and the fruit of two plants that grow along the swampy margins of the rivers and small streams, *Drepanocarpus lunatus* and *Montrichardia arborescens*.

The periodic migration of birds presents also some curious point of interest in Guiana. Thus genera such as *Charadrius*, *Gambetta*, *Totanus*, *Symphemia*, etc., which pass through our districts in enormous numbers on their downward journey from the temperate districts in September and October, are never seen by us in the spring on their return journey northward. Curious, too, is the fact that while these are only chance visitors once a year, other migratory birds, like the Yellow-bird (*Dendræca*), which become extremely plentiful in the months of October, November, December, January, February and March, yet remain in diminished numbers the year round, and even nest and rear their offspring in the tropics.

Local migration, too, is noteworthy—dependent on the seasons, the dryness or flooding of the savannahs, and the flowering and fruiting of certain trees, shrubs or grasses, as well as on the consequent abundance of insects. Food relations such as these are most marked in such cases as those of Wild Ducks, Cotingas, Parrots and great numbers of the *Grallæ*.

One characteristic of our birds that strikes the beholder most forcibly is their astonishing brilliance and vividness of

coloring. Cases of such birds, shown in the British Guiana exhibit in the Columbian Exposition, have been a revelation and a marvel to visitors who, at the same time that they can hardly believe such brilliant tints to be natural, yet realize that they could not be produced by artificial means. In many cases this brilliance is only characteristic of the adult males, the young males and the females being both alike, and of quite sober plumage. Cases such as the Bell-birds (*Chasmorhynchus*), the Cotingas (*Cotinga*, *Xipholena*, etc.), the Firebirds (*Phœnicocercus*), the Cock-of-the-rock (*Rupicola*), the Humming-birds (*Trochilidæ*), etc., will at once occur to you. In other cases, the males and females are colored equally, or almost equally, brilliantly, such as the Scarlet Ibis (*Eudocimus ruber*) the Macaws (*Ara*), the Jacamars (*Galbulidæ*), the Bill-birds (*Rhamphastos*), and others, though in many of these cases the young birds of both sexes are quite different in color from the adults.

The peculiarity of tint in many of our species is well worthy of notice—the pure white of the males of the Bell-bird (*Chasmorhynchus albus*); the variegated grays of the Giant Goatsucker (*Nyctibius grandis*); the intense green tints of the Parrots (*Chrysotis*); and the rainbow-colored Tanager (*Calliste tatao*). Sexual relations (as in the first case), and protective (as in the second and third), evidently serve to explain the advantages of such coloring.

While on the subject of coloring, it is interesting to note that certain tints, in certain of our birds, can be entirely and permanently changed by the application of heat. Thus the purple tints on the throat, breast and body of *Cotinga cayana*, *C. cærulea*, and *Xipholena pompadora*, can be changed to a brilliant red by exposing them to heat in such a way as to affect those feathers without singeing—an indication of the possibilities in nature under changing thermal conditions! Here, too, must be recalled the change produced in so many of the Green Parrots by the native peoples of Guiana, who, by feeding these birds on a special diet, consisting largely

of pounded corn or maize, produce eventually yellow-colored birds. In the former case, the change is evidently a chemical one—probably of reduction; while in the latter, it would seem to be of the nature of the elimination or substitution of certain elements of the normal coloring, dependent on certain normal kinds of food material.

The peculiarity of form in many different organs of our birds is also noticeable. Thus the elongated and peculiarly curved beak of *Xiphorhynchus* the boat-bill of *Cancroma*, the scissors-bill of *Rhynchops*, the swollen tubular bill of the Toucans and Jabiru (*Rhamphastos* and *Mycteria*), and the keel-bill of *Crotophaga*, excite wonder, as much so as the great gapes of the Calf-bird (*Gymnocephalus calvus*) and the Giant Night-Jar (*Nyctibius grandis*). The elongated tails of the Macaws (*Ara*), the forked tails of *Milvulus*, and the plucked central elongated tail-feathers of *Momotus*, may also be mentioned, as well as the peculiarities in beak, crests, puffs and tails of so many genera of Humming-birds, such as *Topaza*, *Discura*, *Lophornis* and others.

One of the most curious structural features in any of our birds is that found in the appendages of the genus *Chasmorhynchus*. As narrated elsewhere (see "Timehri," June, 1892, Georgetown, British Guiana), I have recently been able to ascertain that the intermaxillary caruncle in *C. albus*, has no influence on the notes of the bird, and cannot be erected in the peculiar vertical manner shown in all the former illustrations of the bird. This organ is extremely extensile, and at the time of utterance of its notes by the bird, hangs down to as much as five or six inches; but it never becomes inflated with air, neither when the head of the bird makes its horizontal movement for the anvil-like ring of "Kong-Kaay," nor during its vertically upward movement for the bell-like sound "Do-rong."

Brilliant as so many of our birds are, it must be confessed that song, or sweetness of sound, goes not with their beauty —at any rate, not with the most beautiful. The Macaws,

the Bill-birds, the Cotingas, the Firebirds, the Jacamars and such-like species give utterance to notes by no means sweet —in fact it might be said that the notes of the most striking of our voice-birds are quaint, discordant and harsh, or mysterious and ghostly, as will be recognized by any one who ever hears the cry of the Hannaqua or What-o'clock (*Ortalis motmot*), the Bultata (*Ibycter americana*), the Calf-bird (*Gymnocephalus calvus*), the Giant Night-Jar (*Nyctibius grandis*), or the Who-are-you (*Nyctidromus albicollis*). It must not be imagined, however, that none of the tropical birds are sweet singers, for the notes of the native Thrushes, the Wrens, and many of the Tanagers and Hang-nests are extremely sweet—the members of the two latter groups combining both beauty and song. The notes of the tropical Wrens, in fact, are far and away beyond those of their temperate brothers; and the cheeriness and sweetness of their notes, resounding through the gardens and houses, where they will perch and carol quite close to man, have earned them the common name also of "God-bird." The commonest cry heard in Guiana, at any rate in the open lands and cleared parts of the coast, is the harsh challenge of the common Tyrant-shrike (*Pitangus sulphuratus*), whose "Qu'est-ce qu'il dit" is to be recognized at all parts of the day.

Most curious of all our birds, however, in structure, habits, affinities and food relations, it must be borne in mind, is the Hoatzin (*Opisthocomus cristatus*) already referred to; and whose reptilian affinities have earned for it the distinctive title of the "Reptilian Bird." Quite recently the full relations of this bird have been made out, and papers on these points will be found in recent numbers of the Transactions and Proceedings of the Zoological Society of London, The "Ibis," and "Timehri" (Guiana). The presence (1) of well developed ungues on the wings, which are, on this account, grasping organs or legs, and are functional until the growth of the feathers when they disappear by disuse, (2) of a *posterior carina sterni* adapted for the

support of the weight of the bird when perching, (3) the absence of the central carina or keel from the sternum, (4) the presence of an interclavicle, (5) the fusion of the clavicles with the sternum and the coracoids, with several other noteworthy characteristics, specialize this bird as the most remarkable of all living forms of its class.

As will have been inferred from the enormous amount of forest and uncleared lands in Guiana, next to nothing is known of the nesting habits of the greater number of our birds; and a wide but difficult field for exploration lies in this direction. Many of the coast-birds have been well studied, and also the chief of the game-birds, the eggs of which are often placed under the common hen, and the brood reared. The Muscovy Duck well illustrates the advantages to be derived from the domestication of a wild species; and equal advantages would seem to lie in the direction of the large Curassow or Powis (*Crax alector*), the species of Maroodi (*Penelope*), and the Maams (*Tinamus*) —the flesh of all of which is very delicate. The birds, too, are very hardy—the Powis, in particular, becoming so tame and of a nature so pugnacious as to supply the place almost of a watch-dog in the yard for keeping out intruders.

Touching for a moment on the obtrusiveness of bird-life in Guiana, I might mention that the birds commonly met with in the towns and villages and their surroundings include such forms as the Qu'est-ce-qu'il-dit (*Pitangus sulphuratus*) and similar species of Tyrant Shrikes; the Cuckoos, like the Ani or Old Witch (*Crotophaga ani major*); the Wren (*Troglodytes furvus*); Icterine birds or Hang-nests, like the Robin (*Leistes guianensis*), the Mocking-Oriole (*Cassicus persicus*), the Yellow Oriole or Plantain Bird (*Icterus xanthornus*), the Blackbird or Black Oriole (*Quiscalus lugubris*); the Thrush (*Turdus albiventris*); the Tanagers of the genera *Tanagra, Rhamphocœlus, Saltator*; Swallows of the genera *Progne* and *Tachycineta*; Finches of the genus *Spermophila*; Ground-Doves (*Chamœpelia*); various species of Humming-

birds of the genera *Lampornis*, *Agyrtria*, *Lophornis*, *Chlorostilbon*, and *Campylopterus ;* the Bush-Shrike (*Thamnophilus doliatus*) ; the Vultures (*Cathartes atratus*, *C. aura*, *C. urubitinga*) ; and the common big-billed Buzzard (*Asturina magnirostris*). Along the great rivers and small streams, various species are met with of Ibises, Herons, Kingfishers, Parrots, Macaws, Bill-birds, Barbets, Jacamars, Swallows and Swifts, Trogons, Divers, Pigeons, Woodpeckers, Hawks, Tree-creepers, Hang-nests, etc. Along the coasts, the Herons, Ibises, Gulls, Bitterns, and Swallows are encountered everywhere. In the forest the most characteristic cry is that of the Greenheart-bird or Pi-pi-yo (*Lathria cinerea*), though many others are almost equally common.

Perhaps, in conclusion, you might allow me to say a few words on the protection of birds by our government. Some few years ago, an indiscriminate slaughter was begun of certain species of our birds of fine plumage on the coast, in order to obtain certain parts alone for trade purposes. Our government promptly met this by enacting a law for the prevention of the killing or wounding of any of our birds, with the exception of the game and other food birds; and these were allowed only to be killed during an open season declared by law. Any one offending against this ordinance is by law subject to a fine of $24 for each bird or part of a bird found in his possession, or for each bird killed or wounded, with the exception that it be proved that it was killed for the purpose of food, and more than ten miles from any plantation at which food might be obtained. The law may be put in operation by any citizen, and the justice of the peace has no option but to enforce the full fine. Permits, under license from the Governor, may, however, be obtained for the procuring of birds for scientific purposes, proof being adduced to show that the applicant for such a license is a taxidermist qualified to prepare such specimens.

The law deals with the killing of birds for purposes of trade. It cannot brand as illegal the wearing of feathers for purposes of ornament. The brilliant feathers of many food birds are just as available, logically, for purposes of ornament as any other kind of suitable material. It could not be termed cruel or inhuman, unless the feathers worn were obtained from birds killed for the express purpose. The obtaining and wearing of sealskins, furs of sable, ermine, otters, etc., is just as heartless and as cruel, though the offenders in these cases, in pointing the finger of reproof at the poor feather-wearers, seem to be quite oblivious of the fact of their own encouragement of equal cruelty and inhumanity.

SONG-BIRDS OF THE PACIFIC COAST.

BY LYMAN BELDING.

THE Pacific Coast has many fine feathered songsters.

The Western Meadow Lark with its numerous loud, sweet and always cheery songs, which are heard in all the agricultural districts, in sunshine and shower, in summer and winter, is a general favorite.

The well known Mocking-bird needs no praise. The Western Robin has a song like the Robin of the Atlantic Coast, with its habit of singing late and early, but finds its summer home in the pines and firs of the mountains instead of the orchards and groves near human habitations. The Russet-backed Thrush, Black-headed Grosbeak, Californian Thrasher, Louisiana Tanager, Bullock's Oriole, Townsend's Soltaire, three species of Purple Finches, and several other birds are excellent singers.

Few birds please and interest me more than Cassin's Vireo. Its notes are few but greatly varied in expression, always sweet and tender, in perfect harmony with its character as I know, having often noted its endearing manners and devotion to its mate during nesting-time.

The Cañon Wren, swift-running, rock-bound mountain streams, high mountains, dark blue cañons, sunlit peaks, and trout are, to my mind, inseparable. Its loud descending whistle, heard in this, its favorite environment, leaves a lasting impression.

The American Dipper has a loud musical song which it utters while at rest and occasionally while flying rapidly up

or down the stream, often rears its young back of a waterfall through which it must fly to reach the nest, has a polite curtsey for every observer, is partial to mountain cataracts, and is one of our most interesting birds.

The musical performances of the Western Lark Finch, Thick-billed Sparrow, Phainopepla, Heerman's Song Sparrow, Ruby-crowned Kinglet, and several other species, are creditable indeed. But Audubon's Hermit Thrush of the Sierras of Central California is my favorite. I think its voice far superior to that of any other bird of the Pacific Coast. Its songs are loud, clear and spiritual. Neither words nor notations will do them justice. They usually consist of but three or four notes, the first note the longest, highest and loudest; but some of the songs have six or eight notes. They differ from the songs of the Hermit Thrush of the Atlantic Coast, judging by the examples given by Simon Pease Cheney in "Wood Notes Wild." Audubon's Hermit Thrush is an inhabitant of dense forest, where it is much oftener heard than seen, and often sings at a height of 50 or even 100 feet from the ground.

NOTES ON THE HERONS OF CENTRAL FLORIDA.

BY T. GILBERT PEARSON, ARCHER, FLORIDA.

Of the sub-family *Ardeinæ*, or true Herons, eight species breed regularly in this section, and for the most part reside here throughout the year. When one wishes to observe these birds to the best advantage it is but a matter of a few hours' drive at most to one of the numerous prairies which may be found anywhere in the pine regions of Florida. These are not prairies in the Western sense, but tracts of flat land, from a few acres to several miles in extent, where trees are prevented from growing by occasional flooding after excessive rains. Here and there are shallow, grassy ponds and lakes, covered with water lilies and holding beneath their surface the roots of straggling bunches of buttonwood bushes. The prairies are covered with a growth of short grass over which hundreds of half wild cattle and hogs roam at will.

These places, at all seasons, are the feeding-grounds of herons; and to the lover of Nature it is a beautiful sight to watch the movements of these graceful birds, cautiously stealing along the margin with head half lowered and eye intent on the water at their feet. Suddenly the head is raised and like a flash the long bill descends upon some unlucky frog or fish—not transfixing it, as so many suppose, but grasping it between the mandibles. Then follows one or two rapid backward movements of the head and neck, and

the food is swallowed. These birds often quit the water, and may then be seen walking over the prairie half a mile from any lake. This is oftener the case soon after rains, when water remains in the slight depressions. The habit is mainly indulged in by the Snowy and Little Blue Herons. They seem to have no fear of cattle, but pass fearlessly among them, and I have on rare occasions seen them perch on the backs of the animals, as Blackbirds sometimes do. By removing the saddle from my horse and allowing him to approach slowly, and at the same time shielding my body, I have often been able to come within a few yards of the feeding birds.

Herons do not as a rule frequent in numbers the few streams we have, the deep water along the shore not being suitable for their mode of capturing food. One may often pass down the Oklawaha or Suwannee for a mile or two without seeing a single large wader, unless, perchance, it be a Green Heron, which turns up on all occasions, and in all places where water is found.

If we wish to see the herons at home we must quit the prairies and go to their breeding grounds. These places may be found on some boggy island covered with trees or bushes; at a pond in the hummock in which buttonwood trees grow; or in the depths of the cypress swamps. Here, amid the wild scenes of a Southern morass, one pauses as he nears the heronry, and in wonder listens to the discordant cries of a multitude of breeding birds. Never shall I forget one beautiful morning in March, when in search of Anhingas I wandered into a cypress swamp where many herons were breeding in the trees surrounding a little patch of open water. As our boat glided among the cypresses, from whose low-hanging limbs swung long festoons of gray moss, so effectually shutting out the rays of the morning sun that only here and there was the dark water flecked with patches of quivering light, the breeze which swayed the topmost boughs brought to our ears the clamor of nesting

herons. In this heronry, besides Anhingas, were found only White Egrets and Ward's Herons—the latter often mistaken for the Great Blue Heron. It is usually the case that large herons are found nesting separate from the smaller species. Only on one or two occasions have I found Ward's Heron nesting with the smaller ones. The beautiful little Yellow-crowned Night Heron sometimes nests in isolated pairs, but usually in small communities, and never in company with other species.

I visited a large colony of herons on Horse Hummock on April 27th, 1888. Several hundred pairs were nesting there at the time. Most of them were Little Blue and Snowy Herons, with some White Egrets, Louisiana Herons, and Black-crowned Night Herons. When quite close to the breeding-grounds I climbed a tall gum tree, and being partially screened by the thick foliage was able, unobserved by the birds, to survey the scene at leisure. The frail nests of twigs were placed in buttonwood bushes and willow trees, in and around a little pond in the hummock. There were but few young; most of the nests contained three to five blue eggs.

Three years later I again visited the heronry at Horse Hummock, found the old gum, and climbed among its branches. But the scene had changed. Not a heron was visible. I discharged my revolver, but the answering echoes and the tapping of a woodpecker was the only response. The call had come from Northern cities for greater quantities of heron plumes for millinery. The plume-hunter had discovered the colony, and a few shattered nests were all that was left to tell of the once populous colony. The few surviving tenants, if there were any, had fled in terror to the recesses of wilder swamps. Wearily I descended from the tree to find among the leaves and mold the crumbling bones of slaughtered birds.

A few miles north of Waldo, in the flat pine region, our party came one day upon a little swamp, where we had been

told herons bred in numbers. Upon approaching the place, the screams of young birds reached our ears. The cause of this soon became apparent by the buzzing of green flies and the heaps of dead herons festering in the sun, with the back of each bird raw and bleeding. The smouldering embers of a camp-fire bore witness to the recent presence of the plume-hunter. Under a bunch of grass a dead heron was discovered, from whose back the plumes had not been torn. The ground was still moist with its blood, showing that death had not long before taken place. The dirt had been beaten smooth with its wings; its neck was arched; the feathers on its head were raised; and its bill was buried in the blood-clotted feathers of its breast, where a gaping wound showed that the leaden missile had struck. It was an awful picture of pain. Sorely wounded this heron had crawled away, and after enduring hours of agony had died, the victim of a foolish passion. Young herons had been left by scores in the nests, to perish from exposure and starvation. These little sufferers, too weak to rise, reached their heads over the nest and faintly called for the food which the dead mothers could never bring.

It is bad to see such sights, from any cause; but when all this is done merely to gratify fashionable women's vanity, it becomes still worse. These are but instances of the destruction of bird-life all over the State. Unless something is done to stop this awful slaughter, it is only a question of a few years before the herons, not only of Florida, but of the whole South, will be exterminated.

Women who know of the cruelty necessary to procure the feathers they wear on their hats, should stop wearing them, and exert their influence to make other women see how cruel and wicked they are. May God's blessing rest with all who strive against this great sin!

THE SUMMER HOME OF DENDRŒCA CŒRULESCENS.

BY JOHN S. CAIRNS, WEAVERVILLE, N. C.

HIGH up on the heavily timbered mountain ranges of Western North Carolina is the summer home of the Black-throated Blue Warbler. Here, in precipitous ravines, amid tangled vines and moss-covered logs, where the sun's rays never penetrate the rank vegetation and the air is always cool, dwells the happy little creature, filling the woods from dawn to twilight with its song, and always busy searching the foliage for insects. The female, though less gayly dressed, is the more interesting of the two. Well does she understand the art of building a beautiful specimen of bird-architecture. Nesting begins early in May and continues until the end of June. The nests are placed in various shrubs, such as laurel, wild gooseberry, and chestnut, but the blue cohosh or papoose-root (*Caulophyllum thalictroides*) seems to be the favorite. These thick weeds grow rapidly to a height of from three to five feet, entirely hiding the ground, and thus afford the birds considerable protection.

The nests show little variation in their construction, though some are more substantially built than others. Exteriorly they are composed of rhododendron or grape-vine bark, interwoven with birch-bark, moss, spider-webs, and occasionally bits of rotten wood. The interior is neatly lined with hair-like moss, resembling fine black roots, mixed with a few sprays of bright red moss, forming a strikingly beautiful contrast to the pearly eggs. The female gathers all the materials, and builds rapidly, usually completing a

nest in from four to six days if the weather is favorable. She is usually accompanied by the male, which, however, does not assist her in any way. The nests are never placed over three feet from the ground; usually about eighteen inches; one I examined was only six inches. Ridgway, in his Manual, says: "Nests on trees in high woods, 20 to 50 feet or more from the ground." Such is not the case here. Coues, in his Key, says: "Nests in bushes, close to the ground."

Four eggs complete the set, often only three. They show great variation in shape, size, and marking; some are well rounded, while others are quite elongated.

The female is very alert, and glides off the nest at the slightest noise. This I think, is caused by fear of animals, as she shows little fear of man and often returns to the nest in a few moments. This is characteristic of nearly all the birds breeding on these mountains; they often allow themselves to be handled while covering their young. The tragedies of these little creatures' lives would fill a small volume. The wild cat (*Lynx rufus*), the raccoon (*Procyon lotor*), and many smaller carnivorous animals are abundant, and various reptiles make their home in the cliffs. All these prey on the young, and cattle ranging on these mountains break off many of the shrubs and weeds that contain nests. Furious windstorms, accompanied by rain and hail, sweep over their breeding grounds, chilling both eggs and young, and sending many a forest giant crashing to the earth. The birds seem to take these things into consideration and usually select a nesting-site sheltered by protecting logs or cliffs. A nest found the past season was sustained merely by one slender stem, as the rest of the supports had been broken off by a falling branch. The weight of the female caused this nest to hang almost horizontally. A fresh egg lay on the ground underneath. The female must have passed the entire period of incubation in nearly a perpendicular position, as the nest contained two newly-hatched young.

These birds are a local race,* breeding from one generation to another. They arrive from the South nearly ten days earlier than those that pass through the valleys on their northward migration. It is common to observe migrants through the valleys while breeders on the higher mountains are already nest-building and rearing their young.

*As this subspecies does not appear to have been named, it may be called *Dendrœca cœrulescens cairnsi*.—E. C.

INSTINCT IN BIRDS.

BY J. H. BOWLES, PONKAPOG, MASS.

It has always seemed to me rather strange that more has not been written upon this subject; for, in the study of birds their natural instincts, which sometimes approach very close to reasoning, have always been a source of great interest to me. I do not intend, in this paper, to refer to any tricks that have been taught them by civilization, nor the more common instincts, such as nest-building, migration and the like, but simply to a few instances in emergencies that I have noticed during my trips.

The methods employed for the preservation of their eggs and young are in some cases well worthy of attention. For example: a few years ago I found a nest of the Towhee (*Pipilo erythrophthalmus*), containing four very young birds, and about 100 yards away a nest of the Blue Jay (*Cyanocitta cristata*), with four young almost ready to leave the nest. Happening to pass the place a few days later, I saw the Jays fly from the Towhee's nest, and, as it was empty, I at once surmised that the Jays had disposed of its contents. Having my rifle with me, I went to their nest and, after flushing the parent bird, shot at her. She dropped to the ground as if dead, but, upon my approaching her, flew off as well as ever, screaming with satisfaction I thought, at the success of the ruse she had played upon me. Some will think that the bird was stunned by the ball passing close to the head without actually striking it; but I have frequently knocked down birds in this manner, and they have

always been half stunned, while this bird was not in the least bewildered.

Another instance I noticed while studying the habits of the American Osprey or Fish Hawk (*Pandion haliaëtus carolinensis*) in Fall River, Mass. The farmers in that vicinity, being mostly fishermen, have decided objections to having the Ospreys disturbed. They claim that the bird does no harm whatever, which is very true, and besides that they show where the fish are. However, wishing to secure one or two sets of their eggs as specimens, I climbed to an inhabited nest, and was surprised to see the bird fly from it to a farm-house that stood some thousand yards distant. She had whistled a few times on leaving the nest; but, on coming nearly over the house, she commenced a series of whistling screams that sounded very ominous to me. It was not two minutes before several farmers armed with clubs appeared and asked me, in no very polite terms, regarding my back and head, to descend or take the consequences. As soon as the farmers reached the tree, the bird became almost silent, evidently knowing perfectly well that she had nothing to fear.

The habit of the Yellow Warbler (*Dendroica æstiva*) of building a double and sometimes even a triple nest to avoid hatching the egg of the Cowbird (*Molothrus ater*) is too well known to be more than mentioned in this connection.

Another peculiar instinct is that of destruction of their own eggs, which seems to seize some birds if their nests are even looked into by man. One special case of this kind that came under my notice was a nest of nine eggs of the Virginia Rail (*Rallus virginianus*). I had in no way disturbed either nest or eggs; yet, upon passing by it some five minutes after having found it, I saw the bird standing among the eggs and stabbing them with her long bill. I quickly interfered, but not before she had demolished three eggs and thrust her bill completely through another without otherwise injuring it. I have the nest and six eggs (among them the

one drilled by the bird herself) still in my collection and prize them far more than my complete set of nine. I have noticed this habit in the Bob White (*Colinus virginianus*); although, I admit, the evidence is purely circumstantial. In a large percentage of nests containing eggs of the Yellow-billed Cuckoo (*Coccyzus americanus*), if the nest is once examined, the eggs will be gone when looked for the second time.

The special instinct of self-preservation is also very strong in many birds. The well known habit of the Crow (*Corvus americanus*) of never, according to the farmers, coming within range when a gun is at hand, is probably the most generally known. It is, however, certainly not the most entertaining, as few things have so much fascination for me as watching a Black Duck (*Anas obscura*) approach a "blind" of which it is suspicious. Always watchful and on the alert for the slightest danger, it will frequently, if swimming, rise from the water and, flying high over one's head, peer down and discover its danger.

Another instance occurred to me the other day while shooting Woodcock (*Philohela minor*). My dog accidentally flushed the bird while ranging in the bushes. Upon hearing its rising twitter, I stood motionless and was both surprised and pleased to see it alight within 15 feet of me. It walked a short distance parallel to me and then, suddenly catching sight of me, squatted on the ground, at the same time spreading its tail and curling it over its back in the manner of a Wren. If I had come upon it suddenly without seeing the performance I should have thought it a curled up dead leaf, for a more perfect resemblance I have never seen.

The Jay family seems to be a shrewd one throughout, for the Long-crested Jay (*Cyanocitta stelleri macrolopha*), of the more mountainous parts of Colorado, rivals the Crow in his dislike for gun-bearing persons, and, at the same time, possesses more boldness and cunning. A Jay will come and feed from a dish set out for the cat; and when puss comes

after him, with the intention of having him as well as her regular food, he hops along just out of reach until he has gone quite a distance, when he suddenly flies back to the dish and eats until again disturbed. This is continued, unless otherwise disturbed, until the cat tires or the Jay has had his fill.

The spiking of small birds and mice upon thorns is a well known habit of the Butcher Bird (*Lanius borealis*), and, I believe, peculiar to the Shrike family (*Laniidæ*), but I think that it can scarcely be looked upon as anything more than ordinary instinct.

The following interesting but pathetic incident I witnessed early this summer, and I think that it showed more bird reasoning than anything that I have hitherto met with. The Blue-headed Vireo (*Vireo solitarius*) is rather a rare bird in this part of the country; therefore, upon finding my second nest containing eggs, I cut off the branch with the nest suspended, and thus left no signs of what was once there. Being curious to see how the bird would act upon her return, I stood behind a tree at a convenient distance and watched. She soon flew to the branch on which the nest had been placed, and very carefully examined the spot where I had cut it off. She then, after taking a careful survey of the branches close to her, flew to the ground exactly under where the nest had been placed, and made a long and systematic search among the leaves, evidently for her treasures, as she ate nothing whatever. If I had not been certain that she would be sitting, in two weeks' time, upon a similar nest and eggs, I think that I should very probably have restored the nest to its old place. A couple of weeks later, I found her second nest and eggs not 50 yards from the former site; and I am happy to say she reared her young in safety.

I will conclude by speaking of a subject which seems to surprise people who know little or nothing about Ornithology. It is not directly applicable to the title of this article, but as I have not seen any other explanation of the subject given,

I trust that my conclusions will not be entirely out of place. It is a reply to a question that has been asked me by so many people, viz: "Hunting Owls' nests on the first of March! Why do they want to nest at such a time of year?" In the first place it is noticeable that the largest birds, as the Great Horned Owl (*Bubo virginianus*), are the first to breed. A few weeks later the Barred Owl (*Syrnium nebulosum*) commences nesting preparations, followed a fortnight later by the Long-eared Owl (*Asio wilsonianus*), and so down to the smallest, which breeds last. The same is noticeable in each branch of the order *Raptores;* the larger birds in each group breed before the smaller ones. It seems to me that this is a provision of nature, for if the Great Horned and Barred Owls were to breed in late April and early May, as do the smaller ones, they would be so plagued by the host of small birds then migrating, as to render the season of incubation a perfect misery. The little Owls, although considerably abused, are of a suitable size to pay back their tormentors with good interest when they wish, while the larger birds would not be quick enough to do so. As examples in the Hawk family, take the Sharp-shinned Hawk (*Accipiter velox*), which breeds late in May, when many little birds have eggs, and the Red-shouldered Hawk (*Buteo lineatus*), which breeds in early April, when the small birds have not even commenced to build. The Sharp-shinned is plagued with impunity by no bird besides the Kingbird (*Tyrannus tyrannus*), which latter fears nothing of the bird creation; while the Red-shouldered is so big and clumsy that he may be tormented and knocked about by any bird from the Crow down.

ON BIRDS' NAMES.

BY WM. G. PRAEGER, KEOKUK, IOWA.

ORNITHOLOGISTS can never be accused of having neglected the scientific names of birds. The majority of our text-books commence each article with a long list of so-called Latin names, each one followed by references quite untelligible to the average citizen. Many of our museums exhibit rows of mounted specimens, to each one of which is attached a label with a scientific name in large type, while it may or may not give a few other particulars. The beginner whose interest has been aroused by watching the birds themselves from day to day, when he inquires further into the science, is brought face to face with these terrible words, and is often convinced that a mastery of scientific names is the first step toward the desired knowledge. Becoming discouraged when he sees so much dull practising of the scales and five-finger exercises before him, he eschews all text-books, continues perhaps to watch birds with a rather hopeless pleasure, and dies still wishing he knew something of ornithology.

While I believe that Latin names are a scarecrow to some and that, on the other hand, many forget that "nomenclature is a means, not a end," yet I do not undervalue their importance. Dried skins with dried names attached are indispensable to science; the more of them we have the better. The skins of dead birds, at times mounted to simulate life, and the words of a dead language, revitalized by our rules of nomenclature, have much to teach us. But I contend that for many of the broadest, highest and best

uses of ornithology we want the knowledge of living birds; and that they must be spoken of, written of, or sung of in a living language.

It is in plain English that the most useful work of the bird-lover must be done. Only in their own language can the interest of school children in birds be aroused; can the farmer be taught his truest friends; can the legislature be induced to give birds the needed legal protection; can appeals be made against thoughtless destruction of so many species for fashion's sake; can the study of birds be popularized and the love of birds increased.

When the Committee of the American Ornithologists' Union published their well known Check-list, they found it necessary to preface it with some 70 pages of principles, canons and recommendations to govern the nomenclature used therein. Scientific names may perhaps be governed by such, but language is a growth and not a creation, and for our popular names no such hard and fast rules can be laid down. Nevertheless, there are perhaps principles of common sense and canons of good taste that may help us to give to each of our birds a characteristic, workable, and euphonious name.

The American people are performing a great work almost unconsciously. As the mythical man in Eden is said to have given names "to the fowls of the air and to every beast of the field," so we have to give a name to every living creature in this new land of ours.

That the vernacular names of our birds are not at present in an entirely satisfactory state every one who has occasion to use them will admit; and the same will be noticed of the names of other animals, especially fishes, and of flowers and trees; and what I am saying will apply more or less to all these. Every one who has tried to get information on birds from friends, both intelligent and willing, has found that confusion in names bars all chance of obtaining reliable information. Take for instance the names of our Ducks. In

Europe among sportsmen, fishermen and those who do their business on the great waters, I usually found their information reliable as to the birds they met with; they might use local names, but they used them correctly; were often familiar with a bird in its various plumage of sex, age or season; and knew a stranger when they met one. But in our new land the case is very different; the most hopeless confusion of names prevails among the majority of duck-hunters; in the same locality different birds are known by the same name, and the same bird by different names. Our common Ring-necked Duck (*Aythya collaris*) I have heard called by at least five different names, most of them belonging properly to other ducks; while the name "Widgeon" I have heard applied to four species, only one of which had a shadow of title to it; and the name had, after all, better be left to the well-known European bird (*Mareca penelope*). To obtain reliable data as to the occurrence of a certain species from those people who ought to know it best, is, under such circumstances, almost impossible. But are not the naturalists themselves largely to blame for this state of things? I here use "naturalist" in its broad sense, which should include every thoughtful human being. Are they careful enough themselves as to what vernacular names they use? Do they not often use an incorrect name because their hearer has used it, or because all vernacular names are unscientific, and therefore it does not matter? And if a correct name is used, is it not often a "book-name" utterly unfitted for the needs of our democracy?

The average farmer, boatman, or duck-hunter is not likely readily to learn such names as Greater Scaup Duck, Buffalo-headed Duck, Ring-necked Duck, or Red-breasted Merganser. The name "Brant" will continue to be misapplied till some handier name is found for the bird usually so called in this part of the country, than American White-fronted Goose (*Anser albifrons gambeli*).

Now I do not wish it to be understood that I would

eliminate such names from the books. All I protest against is pedantry on the one hand, and indifference on the other. The book-names have good reasons for being, and often mean a great deal. There is no bird at all like the American White-fronted Goose in this country, and therefore the long descriptive name is quite unnecessary for common use; "White-fronted" was given by European naturalists to distinguish *Anser albifrons* from several other geese of the same genus found in Europe, and then "American" was added to distinguish the variety found in this country. The Ring-necked Duck (the Blackjack of the duck-hunters) was first described from a specimen found in Leadenhall Market, in London, in 1801 (Donovan, British Birds, VI. 1809, pl. 147),* the only one of the kind I believe that has ever occurred in Europe; it was not at the time known what part of the world the stranger had come from; the rather inconspicuous chestnut collar served to distinguish it from the Tufted Duck of Europe, which it closely resembles, and hence gave it both its specific name—*collaris*, and its vernacular name—Ring-necked.

In vernacular names there is no harm in synonyms, and it is only by acknowledging them, and by using them, that we shall ever get a good popular nomenclature. Indeed there is something encouraging in a bird being known by several names, as it is the more familiar birds that have most names, and therefore, as birds become better known to the people, popular synonyms are likely to increase.

Local names do no great harm, and are often pretty and interesting; but by this I do not mean names locally misapplied, as these are one of the greatest evils we have to contend

* Mr. Praeger is correct in citing this case as that of the first published description, but he will be interested to learn that before Donovan's specimen had been named and figured, the species was discovered by Captains Lewis and Clark, at Deer Island, on the Columbia River, in Oregon, March 28th, 1806; under which date the explorers give an excellent description in their original manuscripts: see my edition of Lewis and Clark, 1893, p. 888.—E. C.

with. As an example of an excellent use of provincialisms take the following pretty verse:

"The sober laverock, warbling wide,
Shall to the clouds aspire;
The goudspink, music's gayest child,
Shall sweetly join the choir;
The blackbird strong, the lintwhite clear,
The mavis mild and mellow,
The robin, pensive Autumn cheer
In all her locks of yellow."

Now though four of the six birds here mentioned are called by names not commonly met with in our manuals, there is not a shadow of doubt as to the particular birds that Burns meant.

As to names misapplied, there is a case of mounted birds in the exhibit of the Smithsonian Institution at the World's Fair, that illustrates well the extent to which this evil has been carried in one direction. This contains a number of English and of American birds that are known by the same name in their respective countries, though they are quite different species. It is of course the Americans who are guilty of adopting English names for their own birds; and the patriotism of our people, and their love of that language and literature which is the precious inheritance of both countries, must be appealed to, to mitigate the evil as much as possible.

Some of these names are now ineradicable. "Robin," for instance, has come to stay, and will be applied both to the English Warbler (*Erythacus rubecula*), and to the American Thrush (*Merula migratoria*), to the end of time. But many duplicate names can be avoided in speaking of American birds. Such names as Goldfinch, Bee-bird, Tree Sparrow, Blackbird, Ortolan, and Coot, are no better for the birds often so called, than Yellow-bird, King-bird, Winter Chippy, Grackle, Sora, and Scoter; and the first mentioned really belong to European birds.

Why should we call a bird "Yellow-hammer," which is properly the name of a European Bunting (*Emberiza citrinella*), when we have such a variety of native names for this Woodpecker (*Colaptes auratus*) to choose from as Golden-winged Woodpecker, Pigeon Woodpecker, High-holder, Yucker, Flicker? Yet one of our best manuals in a recent edition gives "Yellow-hammer" the preference.

Among the names of genera and families the same evil prevails. The family *Icteridæ* is particularly unfortunate. As a whole it lacks an English popular name, and its various subfamilies are known as Starlings, Larks, and Orioles —all very misleading names, as they properly belong to families of old-world birds, not found in America. "Starling," applied to American birds, is chiefly found in books, however; "Lark" is probably ineradicable, and I know of no substitute, though it is very misleading; "Oriole" has also come to stay, apparently, though several substitutes suggest themselves, of which "Hang-nest" is perhaps the best. I notice that European naturalists often apply this name to the whole family *Icteridæ*, and though it is not altogether appropriate, they certainly avoid confusion with the old-world family *Oriolidæ* by so doing.

The finest work ever done in economic ornithology is the investigation recently carried on by the Department of Agriculture as to the food of Hawks and Owls. But how slowly will the lesson learned thereby spread among those to whom it will be most useful, and how much the want of a language will delay it! If such names as Falcon, Hawk, Buzzard, Kite, Harrier, and Osprey were in common use, the outlook would be more encouraging; but many farmers know only three kinds of hawk-like birds, naming them, according to size, Hen-hawks, Chicken-hawks, and Sparrow-hawks; and indiscriminate warfare is waged against them all.

We must not forget the prominent place birds hold in our higher literature, nor how very important names become there. I hope all ornithologists love poetry. I know all

poets are ornithologists. Poetry teems with references to birds; they enter into every scene; whether it be the Sea-mew in the ocean storm, the Swan viewing its image in the placid lake, the Eagle screaming from the mountain cliff, or the Thrush warbling from the flowery thicket, their singing, their nesting, their annual journeys, are called on to appeal to all our tenderest feelings. In a host of birds—the Eagle, the Dove, the Raven, the Swan, the Pelican, the Owl, —in "the rage of the Vulture, the love of the Turtle," poets have found a simile for man's fiercest passions, highest ambitions, or dearest hopes.

Should it be that we have to lay down our Shakespeare or our Wordsworth, and take up our ornithological text-book, before we can comprehend some passage, and all because of the confusion of names? The English reader will call a momentary halt to think that the Robin he knows builds in holes in banks, and uses moss and hair, without any mud in the construction of its nest, when he reads our American poet's lines:

> "Thet's robin-redbreast's almanick; he knows
> That arter this ther' 's only blossom-snows,
> So, choosin' out a handy crotch an' spouse
> He goes to plasterin' his adobe house."

And, on the other hand, in the Ingoldsby Legends we meet the lines:

> "Slower and slower, he limped on before,
> Till they came to the back of the belfry door,
> When the first thing they saw, midst the sticks and the straw,
> Was the ring in the nest of that little Jackdaw."

And we remember that the so-called "Jackdaw" of the Gulf States (*Quiscalus major*) does not nest in belfry towers, and if he has any of the thieving proclivities for which the European Jackdaw (*Corvus monedula*) is famous, I have never heard of them.

Of all our American poets Lowell has undoubtedly made the most, and the best, use of birds. And it is probably

largely because in his ornithology, as in everything else, he was a true American; and also because he habitually used names that originated in the fields and woods. In the Biglow Papers he makes this protest in favor of our own birds:

> "Jes' so with poets; what they've airly read
> Gits kind o' worked into their heart and head,
> So'st they can't seem to write but just on sheers
> With furrin countries and played-out ideers,
> Nor have a feelin' if it doosn't smack
> O' wut some critter chose to feel way back.
> This makes them talk o' daisies, larks and things,
> Ez though we'd nothin' here that blows an' sings.
> Why, I'd give more for one live bobolink
> Than a square mile o' larks in printers' ink."

And he always uses good common names. In that beautiful description of a bird and its life in just two lines we read:

> "In ellum shrouds the flashing hangbird clings,
> And for the summer vy'ge his hammock slings."

And in another poem:

> "And the wanderer is welcome to the hall,
> As the hangbird to the elm-tree bough."

But we hear nothing of the "Baltimore Oriole" in his writings.

I believe our naturalists are gradually getting away from the methods of old schoolmaster Dryasdust. A few years ago our books only knew of the Great Northern Diver, for which "Loon" was a despised provincialism. Of what use is "Great Northern Diver" to a poet? But those who know the habits of the Loon, and have heard his call among the lonely surroundings he loves, will appreciate the use made of him in the opening of that mysterious, prophetic poem, "The Washers of the Shroud:"

"Pale fireflies pulsed within the meadow mist
Their halos, wavering thistledowns of light.
The loon, that seemed to mock some goblin tryst,
Laughed, and the echoes, huddling in affright,
Like Oden's hounds fled baying down the night."

This quotation will illustrate also, how the least known birds often find their way into the writings of our poets; for as I said before, poets are usually good ornithologists. Taking again a bird often wrongly called "Loon," we might suppose poets would have little to say of a big, strong, black, hook-billed, green-eyed bird—ugly, if any bird can be ugly; and yet we read in Scott:

"Fast as the cormorant could skim,
The swimmer plied each active limb."

And Longfellow writes:

"As with his wings aslant,
Sails the fierce cormorant,
Seeking some rocky haunt,
With his prey laden;
So toward the open main,
Beating the sea again,
Through the wild hurricane
Bore I the maiden."

And in Paradise Lost we again meet it in a most appropriate simile:

"Thence up he flew, and on the tree of life,
The middle tree, the highest there that grew,
Sat like a cormorant."

But if we begin on poets and birds we open an endless theme, as varied and as beautiful as any offered by nature and her best interpreters. I have shown, I hope, the important place birds hold in all our highest literature. And as with the poet, so with the scientist, the economist, or the humanitarian—good names for birds become essential to

good work. I have no exact laws to propose that could correct the evil noticed; nor if such should be made, could they be enforced. But there are great opportunities for influence that will suggest themselves to the members of this Congress; and now, while our science as a popular study, and our country, are both young, is the time for work. In the many ways and places we are working for birds, opportunities are frequent for a little care and thought in our choice of names. The matter may appear unimportant to most of you, but among the many things before this convention, which I willingly acknowledge are of more importance, I dare to hope that my protest, and my appeal, will not be entirely forgotten.

SIDE THOUGHTS ABOUT BIRDS.

BY FRANK E. COOMBS.

In presenting this hastily prepared paper, it is due to say that my intention is not to submit a formal treatise upon birds from any definite standpoint, nor to specially discuss any single bearing of their relation to us. I take for granted that little which is new would be so added to the knowledge of those already versed in bird lore, but that a touch upon some of the manifold interests the subject holds for all, may turn the thoughts of others toward a field of natural history as accessible as it is fascinating and instructive.

From the remotest times the forms of life surrounding him have pressed their claim in one or another way upon man's attention. As food, as purveyors of clothing, or as cruel enemies, some plants and animals have everywhere been woven into his daily life, coming down to us in rude bone carvings and rock picturings, and in tribal legends and totem-posts. But it is interesting to note that while in the myths and folk-tales of nations the four-footed beasts were almost invariably connected with ideas of violence, cunning and terror—like the widespread story of the were-wolf, older than Greek civilization, and the Hindoo legends of the tiger—whenever the bird appears it is generally as the friend and protector of mankind. Thus the Arabs celebrate the mystic Roc; the Hebrews made the Dove the messenger of a rejuvenated world; Grecian sailors loved the storm-pacifying Halcyon; and the house-top Stork is as sacred from harm in Holland to-day as the Ibis was in Egypt five thousand years ago.

Birds, from their free flight in the pathless air, and their mysterious coming and vanishing, have always appealed to the reverent side of the human mind, and have symbolized beauty, love and the peaceful virtues, enjoying a full share of mention in prose and poem. In ancient travelers' tales are the beginnings of natural history. But amidst much that was truly seen and told was many a fanciful superstition—stories of the Phœnix, dying consumed by celestial fire, its single progeny rising from the parent ashes; of the Geese that grew from barnacles, and of the Swallow, said to bury itself in the mud at the approach of winter, coming forth unharmed into the spring sunshine. As men traveled more and the means of comparing observations upon our running, swimming and flying world-mates grew readier, these fables perished one after another, and there came a wish to know the truth about them. The addition of facts led in time to their separation into special classes of facts, these sets being slowly subdivided into the many mutually dependent specialized departments of our own day. So Ornithology, the study of birds in general, may be approached from many points. The scientific classifier busies himself in making clear the affinities of groups of birds which have essential characters in common, with other such groups whose distinctive characters are different, and for this purpose he asks the aid of those who have had opportunity to study the ways and habits of birds of many regions. He is helped furthermore by the comparative anatomist, who knows their hidden similarities of structure; and calls upon the paleontologist for the testimony of fossil types, long extinct, which fill gaps which would otherwise lie between now very widely varying groups.

The economist, too, is occupied in studying the value of bird-life to mankind, either as food or in its benefits to agriculture, determining as far as possible in what manner the usefulness of birds to man may be increased, their harm controlled when it occurs, and valuable species protected and

increased. The work of each depends for its success upon that of the others, and derives its special value from such co-ordination.

A great change has taken place since the observation and study of birds was confined to a comparatively few men, who worked with little other motive than a love for searching out the haunts and habits of their woodland, field, and roadside friends. Popular thought has been turned to the ways of birds and the interest awakened in them. Of late years our best periodicals have given us many bright and charming glimpses of the homes and employments of the small fowl which make their summer quarters with us, or stay resolutely through the period of cold and snow. We have visited our "little brothers of the air," have looked at "birds through an opera glass," and have learned that the student of birds is by no means of necessity a hoarder of dried skins, or a careless slayer of his friends.

Perhaps of the practical applications of accumulated knowledge regarding birds, the most recent is that which is now being made by our Department of Agriculture and the allied experiment stations of the several States, in an attempt to determine what species are beneficial and what are harmful to agriculture.

Naturally enough, the farmer takes particular notice of the birds which have their homes near or occasionally visit him, only when some pronounced useful or deleterious agency is often enough repeated to excite remark. Moreover, it is principally the damage suffered that he can estimate, for the gain in the destruction of noxious insects, field mice, gophers, etc., is indirect, unlike the harm, which is always patent. Thus many birds are associated in his mind with rifled cornfields and missing poultry. His own eyes have seen the wary Crows decamp from newly planted fields at his coming; he has seen his rice field darkened with swarming Blackbirds, and has many a time run out, gun in hand, just too late to save his fattest pullet.

The often more than compensating good which some of these birds do is of a nature to escape his sight, however, and the comparatively few species which are of more harm than benefit, give a bad character to many species of similar appearance which are eminently beneficial in their relation with the farm.

A recent Bulletin of the Agricultural Department, treating of the "Hawks and Owls of the United States," is based upon extensive examination into the general habits and actual stomach contents of hundreds of individual birds from all localities, and throws a new light upon their status in farm economics. To be brief, the work clearly proves that of all the Hawks and Owls upon which the wrath and buckshot of the farmer are expended, but six species are harmful, and of the six, "three are so rare that they need hardly be considered."

Even the Crow, perhaps the most universally hated of birds, has been, after careful study, placed in the category of malefactors by but a slight excess of harmful over useful activities.

It is undoubtedly too much too ask of the farmer that he shall become sufficiently a field ornithologist to discriminate on sight between closely similar hawks or other birds. His direct vengeance is ordinarily exercised toward feathered invaders "taken red-handed." He gives little time to deliberate pursuit of birds of any sort; yet he can be wisely cautious when he is asked to support enactment of laws which offer bounties for their destruction. His influence in this way can be certain and effective, for the history of such bounties has more than one instance of costly mistakes.

We are but beginning to gain a fairly clear idea of the complex reactions between various forms of organized life, and the unforeseen ways in which these mutual influences hold one another in check. Human intervention with this machinery is quite apt to bring about undesirable accidents, worse than the evils eliminated. Allusion may be made to

the importation of the European Sparrow, which has become an unmixed nuisance, occupying as it does densely populated town and city districts, where its presence is of no imaginable utility, its bulky nests an increasing disfigurement, and its ceaseless chirp a perennial annoyance.

To the preservation and increase of our native game-birds effort has been directed for many years, and with the rapid diminution of wild land and equally rapid growth of a market for such game, the need of more effective protection is yearly pressing. Certain game-birds, once everywhere plentiful, are by their very habits inevitably doomed to practical disappearance, such as the Wild Pigeon and perhaps the Turkey. But there is a large class of such birds —Woodcock, Snipe, Quail, the various species of Grouse, and some others—which, far from being interfered with by simple proximity to man, are really enabled to increase more rapidly by his occupation of the land, since much of their food is derived from wind-scattered grain, and favorable cover is afforded by brushy clearings which have replaced former timber lands.

Such game-birds, then, as are not disturbed by changed conditions incident upon removal of forests and cultivation of the soil, may evidently be augmented in numbers by appropriate management. Whatever legislation can effect has probably been already undertaken, but there remains the really important need of awakening intelligent appreciation of the importance of such laws, and of forming a public sentiment in which alone resides their enforcement.

Laws prohibiting the taking of game-birds at other than prescribed seasons will be evaded so long as there are ready purchasers for them, and hundreds of barrels of Quail and Pinnated Grouse will continue to be shipped to cities while dealers are ready to profit thereby and the supply holds out.

From what seems to the writer a reasonable point of view, wild game is to be regarded as a natural and to a certain degree limited source of food-supply, capable of being re-

tained in its present extent and in some measure increased by regulated use and prudent management, but open to complete exhaustion by a few years of unchecked wastage; and lastly, as a supply not to be indiscriminately levied upon either by wholesale snarers who furnish the public through the markets, or on the other hand to be wholly dedicated to a certain class of sportsmen whose sole pleasure is in bagging a maximum quantity in a minimum time. Both the pot-hunter and his more respectable rival have rights in the common property, but each must be restrained within decent bounds by law or his own sense of the fitness of things.

Of the use of our handsomely plumaged birds by the milliner it is needless to speak at much length. It is foolish to argue that wings and feathers are not among the most graceful of ornaments in form and color, and in their blending with feminine head-gear—every woman knows better! The only appeal is in asking them to forego one dear luxury for humanity's sake, and to remember that the birds they admire at mountain and countryside are the fewer for its indulgence.

Putting aside all question of utility, however, there is enough in the purely æsthetic aspect of our subject to furnish motive for interest in birds and their manners. Few can fail of kindly wonder at the way of their fare and welfare, in the occupations which busy them, in their domestic arrangements and in their exquisite adaptation to manifold environments. In form and structure they are diverse as the open ocean, dense forest, rolling plain, and farm-dotted hill and valley, which offer such a congenial home to some member of the feathered family; and there is no nook in Nature's larder but has its specially favored set of pensioners.

By lake and river margin long-legged Crane and Heron stand patiently in the reeds or pace their frontier like noiseless sentinels. Over them flies the rattling Kingfisher to his fishing ground in deeper water. Woodpecker, Nuthatch, and

Creeper mount the tree-trunks, each by his chosen path of straight line or spiral, one gleaning his daily ration from the bark clefts and another sounding for fatter grubs that hide beneath it, seldom using his strong chisel in vain.

Below, in the grass, the Sparrows are ever busy, and the topmost twig of the tree overhead is searched faithfully, over and over again, by the army of Warblers and Flycatchers, while high over all swing Hawk and Vulture—police and sanitary of the winged commonwealth.

With the early days of each returning spring there is no sound more welcome than the notes of Bluebird and Song-Sparrow. Silent they come overnight and we waken to their sudden morning presence. Far at sea we meet the wide-winged lonely voiced wanderers that know no country other than the wind-swept, tossing water. Those whom chance and winter find in distant southern islands remember well the look of home-suggesting Catbird, Thrush and Warbler—fellow exiles met in cane field, mangrove swamps and guava tangle—familiar friends all, but strangely set amid the air-plants and rank growths of the tropics.

Taken all in all, there is no aspect of bird-life but has its charm, if eyes and ears will open to it, and once entered it draws surely on to the wish to know better our friends of the air. Birds are close about us always, summer and winter alike, and no long travels are needed to find them and make their acquaintance. Whoever loves field and wood finds in them a new motive and a fresh pleasure for his excursions.

Each new set of acquaintances we can make among our finned, furred and feathered co-tenants of the world, gives a deeper hold on the Life that runs common to all alike and opens wider the doorway to its pleasures.

THE HOMING FACULTY IN BIRDS AND OTHER ANIMALS.

BY C. F. AMERY.

SINCE the progress of comparative physiology has taught us that the lower animals are endowed with a like nervous organization with ourselves, that they are in fact fellow-creatures on lower planes of development; and since more careful observation confirms the natural inference that they are animated with kindred desires and emotions, and in varying degrees with like instincts, intuitions, and capacity of profiting by observation and experience, it is no longer the fashion to regard them as mere living automata. There are, nevertheless, some achievements of the lower animals which are not easily explained by the assumption of mental faculties akin to our own, and chief, perhaps, among these is the homing faculty common to so many animals, and so admirably exemplified in the carrier-pigeon which returns from long distances to its home under conditions which would render the feat impossible for man unless he made a close study of the mariner's compass over the whole route.

Now ascribing to the carrier-pigeon and other similarly endowed creatures the faculties of instinct, intuition, and intelligence, and recognizing that all these aid them in adjusting themselves to the conditions of their environment, the question arises, To which of these faculties is the capacity due? I conceive that it is a purely intelligent act calling for observation, reflection, and calculation; but to render this conclusion acceptable, it will first be necessary

to show that neither instinct nor intuition can contribute anything to the achievement. To do this there must be a clear apprehension of the limitations of the possibilities of these two faculties.

Romanes, one of the most popular writers on the subject, defines instinct as "a reflex action into which is imported an element of consciousness." A chick striking against the wall of its prison at close of the period of incubation may serve as an illustration. There may be a question of the presence of consciousness at the first blow, but it is surely present during the enlargement of the first breach after the lungs are filled. It is a reflex act to which the chick is impelled by its sensations, and instinctive to the extent to which it is consciously performed. It is perhaps the one moment in a bird's life in which it performs an instinctive action. The greater portion, perhaps all, of its ordinary activities are performed under the impulse of instinct—that is, they are prompted by physical sensations; but animals, at any rate vertebrate animals and the higher insects, are in all cases guided to the proper performance of the act to which instinct impels, by intuition or intelligence—that is, by inherited or acquired knowledge. I will illustrate this position by a few examples.

A few days after the chicks have left the shell, a warning cry of the mother bird summons them to take shelter under her wings; they run towards her at the first note of the summons, and one of them encounters a large stone or other object in his course; he runs round this or hops over it. We will suppose that this is the first time the warning cry has been heard by the chicks, or that any obstacle has been encountered by them; their conduct would be the same. There is no question here of any physical sensation impelling them to action; their conduct is consequently not instinctive in the limited sense in which I am here employing the term; they are guided by intuition. The cry of the parent bird in the one case, and the sight of the obstacle in

the other, awaken dormant memories constitutionally ingrained in the brain of the individual as memories of the past experience and observation of the race. Instinct is awakened only by sensation; intuition is called into activity only by perception through the senses.

To add another illustration, we find the chicks a few days old pecking at innumerable small objects lying on the surface; for a time they seize and swallow indiscriminately, both substances fit and unfit for food, but experience soon teaches them to discriminate, and at the end of a week we find them selecting only what is edible. Here the condition of the stomach produces the sensation of hunger, which impels to action; intuition guides to the performance of the necessary act of adjustment, but only imperfectly; nevertheless, it plays an important part by directing the faculties of observation to the right channel, and by initiating the experiments which result in intelligent discrimination. Intuition is now relegated to the background, it has no further function in this department, but the instinct persists, for nothing but its imperious demands would suffice, even in man, to prompt to the necessary efforts to maintain his place in the struggle for existence.

These few illustrations of the functions of instinct and intuition will easily render it clear that they can, neither of them, afford any aid in the wondrous feat of the homing pigeon. Instinct is but an impulse, a craving, a desire. The bird at a hundred miles from its cote has a desire to return to it, but this desire is not even instinctive, it is a psychological emotion, powerful as instinct to impel, but utterly valueless as a guide. Intuition again is only a constitutional memory, born of the experience of the ancestral stock and can exercise no function here. It may play a certain subordinate part in bird-migration, but over a course which the ancestral stock never traversed it is without a suggestion.

It is evident, then, that to account for the homing faculty

we must either cast science to the winds and say, as our pious fathers (and mothers) said, that "God guides the birds;" or we must accept the view that they return by aid of their own intelligent observation of the direction taken in the outward route. No one here will doubt that this is the true solution, but the "how, and by the exercise of what faculties" does not lie on the surface, and the achievement being outside our own capacities, the explanation can be reached only by advancing hypotheses and putting them to the test.

Apart from the negative evidence that the homing faculty is an intelligent one, we have the positive evidence that it is improvable by experience. The feat of returning to the cote from points several hundred miles distant, and over unknown country, although frequently performed by Homing Pigeons, requires more or less preparatory training. Young birds are liberated at comparatively short distances from home, and the distance lengthened with their growing experience, until with their faculties fully developed, and their powers of observation quickened by practice, they may be taken several hundred miles across the ocean with the confidence that, barring accidents, they will return by an approximately straight course. The bird being liberated rises into the air and starts on its return journey. Intelligence cannot point the way without a basis of perceptions derived through the senses, nor can the senses act directly. At a few hundred miles distance keenness of sight can avail nothing, as the desired haven is below the horizon; nor is it conceivable that the superior acuteness of any sense which the bird shares in common with us could afford any possible guidance. It appears to me, then, that the homing faculty must be due to an ever-present consciousness of direction taken, aided by close observation awakened by the desire to return to the cote. I do not, of course, by "consciousness of direction" mean that the bird has an inborn faculty of determining the direction of the distant place he wishes to reach. If this

were the case, the dog, which equally has the homing faculty, could go straight for his game after being thrown off the scent. Such a power, too, is scientifically inconceivable. What I mean is, that in spite of confinement, the bird on its outward course must have had a continuous sense-impression of the direction taken, and of the variations in the course if there were any. Such variations when they are frequent, and extending over a long course, must tax the bird's mental powers severely. Darwin's experiments with bees will be fresh in the minds of most of you. Carried from the hive in a paper box for some distance over a devious course, the bees returned easily; but when the consciousness of direction was confused by spinning the box round *en route*, most of them failed to return, and I assume that the few which did, took a random flight which carried them fortuitously to familiar scenes, from which they made their way to the hive easily. The Carrier-pigeon with a general but imperfect knowledge of the direction of his cote, has the important advantage, that his home experiences have rendered him familiar with all the chief features of the landscape within a radius of perhaps thirty or forty miles of his cote, consequently if he come only within sight of the outer boundaries of the familiar landscape he is able to correct his error. The feat, performed intelligently, necessarily involves a possibility of miscalculation, as with the mariner. In this connection it would be of great interest, whenever possible, to note the direction from which the bird arrives at his cote. I am of opinion that the line of flight at the close will rarely point true to the station from which the bird was cast off, especially if the outward course were erratic, and the bird had never before been over the same course. There are possibly Carrier-pigeon trainers who can recall, by aid of local landmarks, the direction from which their birds arrived from long distances, and confirm my conclusion off-hand.

But now comes the important question: how is the per-

ception of direction acquired? I think we must say certainly not by the higher perfection of any sense which homing animals share in common with us. Insects have organs whose functions can only be surmised, and it is conceivable that they are, by their aid, sensitive to waves of motion to which we are insensible; but birds have no such organs, and if, as I suppose, they are sensitive to such waves of motion, it must be by means of nerves terminating at the surface of the body everywhere, in fact the sense of feeling adapted to the reception of impressions to which our nerves are insensible. The conditions require that such waves of motion must be continuous, omnipresent, and always flowing in the same direction around the globe. As far as our knowledge extends, the magnetic earth-current is the only wave-motion which fulfils these conditions. I venture therefore to suggest as a plausible hypothesis of the homing faculty in so many of the lower animals, that they are sensitive to the ever-present motion of this current. I assume that it is barely appreciable unless the attention is alert and directed to it, but the observation of their own sensations is easily cultivated in animals which have little else to occupy them. The amount of calculation concerned in keeping the outward reckoning of the course certainly involves greater mental powers than some of you will be willing to ascribe to animals; but allowing for the facts, first that animal intelligence being developed only in a few narrow grooves, may easily transcend ours at points, secondly that all possessing the faculty are great roamers, and consequently familiar with the country over a wide radius round their homes, which leaves room for the correction of a considerable margin of error in calculation, and thirdly that even Homing Pigeons do not always return, and that only the cleverest of them are useful for long flights, I do not think that the measure of intelligence demanded is *prima facie* fatal to the hypothesis.

But is the hypothesis susceptible of proof? I think so. In fact it is the certainty that it can be proved experimentally

that emboldens me to hazard it. The method of testing it which occurs to me is to take half-a-dozen well-trained reliable two-year-old birds, and send them round the globe eastward from New York, landing them at San Francisco, and carrying them thence to locations unfamiliar to them, within, say, two hundred miles of their former cote. If my hypothesis is sound the birds would realize that the feat of returning along the course travelled would be beyond their powers, moreover they would have lost calculation in sleep. They would be lost birds when liberated, and could probably be attached to their new home. If on the contrary they should fly direct to their cote I should be dumb "as a sheep before his shearers." To control the experiment two of the birds might be liberated at a like distance from the cote, but in country they have already flown over more than once.

PROTECT OUR BIRDS.

BY HENRY HALES, RIDGEWOOD, NEW JERSEY.

To say that birds have many enemies, is to give but a faint idea of their struggle for existence. As soon as the first egg is deposited in the nest by the parent, however well concealed, it is a cause of anxiety to her who knows the prize is coveted by many a heartless marauder. Crows, Jays and Crow Blackbirds, besides many small mammals and snakes, are constantly on the watch to consume these frail caskets of life-germs. The uninitiated are in blissful ignorance of the great destruction often wrought between the finished nest and the fledgelings. The defenceless species, including all our song-birds, if not prolific breeders, would soon become extinct. It is well to remember the worst enemies of birds, and to discriminate between them. One of the most destructive is the red squirrel. The Cow-bird (*Molothrus ater*) commits havoc among the sweetest songsters, such as Vireos and Warblers. Man is either the greatest protector or the greatest destroyer of birds. Especially is this true since the invention of the gun and the mowing-machine. Dense populations are not necessarily destroyers of song-birds ; the old world shows notable examples of this. The national character may be cultivated to love of, or indifference to, the charms of its feathered residents. Thinning off their natural enemies, giving them food in winter, securing them suitable nesting-places, and abstaining from acts of violence, greatly assist in endearing them and promoting their multiplicity.

Of all animated nature no animals show such lovable characters as birds, to say nothing of their beautiful plumages, delicate forms, and exquisite songs. Their affection and trustfulness to man is to any lover of nature simply marvelous. Whoever has travelled through places where the gun does not shock the ear, or the savage cat does not stalk stealthily about, may see the astonishing confidence birds have in man. It is not uncommon on our Western plains to see a flock of Red-shouldered Blackbirds (*Agelæus phœniceus*) come boldly into the outbuildings and even into the houses, and make themselves quite at home; or in the South, to have the sprightly Catbird (*Galeoscoptes carolinensis*) come into every corner of the kitchen. Many of our northern birds yearn to be noticed and loved, and are only repelled by our indifference and coldness.

This is not the place for many illustrations that have fallen under my notice, but the world is full of incidents of the affection of birds for man. Alas! to be so little realized. To creatures that show so much affection, what a cruel thing it is to repel or betray that confidence! Of all heart-rending proceedings that have disgraced a civilized people the worst is the wearing of the bodies or plumages of birds, whether song-birds or other harmless ones, as ornaments to garments. The destruction of the colony of Terns on Gull Island, off Guilford, Connecticut, described by an eye-witness a few years ago, is a specimen of the cruelty of those engaged in that business. Some men went on the island while the birds were breeding there, and commenced firing at them; all those that were not hurt came circling around in sympathy at the cries of the wounded ones; these in turn were killed, their bleeding forms were carried to the shore in wheelbarrows, and the young left to perish in their desolated nests.

It is so well known how thousands upon thousands of our sweet songsters are sacrificed to the Moloch of fashion, that I need not here detail it. The Audubon Society

frowned down the cruelty of wearing the distorted death-forms of lovely birds on women's hats. May that society's example outlive that fashion, and remind all women of tender heart, of whatever nation, that the cupidity of the wholesale *man milliner* cannot swerve them from the humane purpose, never to wear any part or the whole body of a bird as an ornament. What remains to crown those efforts, is to cultivate a national affection for birds. May every school of our land engender this love for American birds! May each parent do the same at home! In all directions, religious, humanitarian, legislative, or economic, let us cultivate our national love for birds. In no better place or time than this of celebrating the discovery of America, can we resolve to protect our birds.

TO THE RESCUE OF BIRDS.

BY HORTENSIA M. BLACK.

WHEN I was asked to read a paper on the humanitarian side of this question, the request found me very ill; but I wrote your President that I would come if I could, so deeply am I interested in this subject. I have hastily put together some thoughts that are like loving friends to me. I am glad and proud to stand with you and show, if only by my presence, that my heart is with you in this work; for it is my cause and my life-work to aid in delivering the earth from the curse of cruelty, and in instilling into every human heart a respect for creatures which share the earth with us, and have as good a right to it as ourselves.

The question is, how to rescue these little "brother spirits," as Olive Schreiner calls them, from that persecution which is alike their physical destruction and our moral overthrow; for in this question's solution is involved human elevation. The present status is deplorable. Even men wear feathers, à la Yankee Doodle. Every fraternity man "sticks a feather in his hat," and then derides the poor Indian for using the same decoration in a different way. As for woman, she engages in anything cruel for appearance's sake, from swinging a mink around her neck, head and all, to sticking a bird on her hat, although she knows a man gets these things for her by the agony and death of the little creatures. If destructive animals, such as the mink, were the sole subjects for her vanity, one might forgive her; but when the fleece of unborn lambs is her favorite trimming

when fashionable, as in recent years, when for her live birds are plucked, and dead ones skinned, one grows sick over beings capable of such revolting cruelty.

In vain we recount with condemnation woman's vanities and cruelties—vainly we cry that her evils return upon her in physical woe and the lack of man's respect. There is a defect somewhere in our methods, and it is to the solution of this problem that I address myself in seeking to rescue birds from destruction. We need these little feathered beings, that so gracefully flit through the air and swing on the branches of trees; there rises before us the beauteous vision of these lovely creatures in their myriad hues; and the memory of their blithe or pathetic melodies seems almost to bring back sylvan harmonies to our ears. These pictures are part of our youth; we could not bid them farewell. Oh! how can we let the threatened destruction come on the authors of all these tender memories? I was proud of Mississippi when I learned that she had passed a law against imprisoning Mocking-birds; but that aid, whilst appreciated, is but a drop against the sea of sorrow that cruelty causes. We have all read of English falconry, and seen pictures of the hooded bird chained to the lady's wrist, as she gayly goes forth on her prancing steed to destroy innocent birds; and it has seemed incomprehensible that a woman could find pleasure in such wanton wickedness. We have read of ladies at Naples crushing the heads of quail, and regarding it as rare sport. Alas! shall we ever be free from the idea that sport must be bloody and painful to make it real?

Love of inflicting pain, terrible joy over agony, man has concentrated in vivisection. Here too we find woman, who should be an angel of mercy, performing with coolness and method the diabolism of the knife, the burning-iron, and other horrible instruments of torture. A student of medicine described to me a woman's performances in vivisection as exceeding those of the men, if that were possible, and she chose as one of her victims a snow-white dove; yet the last

time I had seen that doctor she was seeking holiness in a prayer-meeting. She did not remember these words—"Holy, harmless, undefiled," but she came to realize that no genuine holiness can visit the cruel heart. The situation is awful beyond description. We read of human tortures in past ages, and still continued in barbarous nations; but religionists claim an eternity of bliss for the human race, and only this brief terrestrial existence for birds and other animals. How much this adds to the claim upon us of these creatures we call lesser, for their right to live happily here, judge ye yourselves! The fact that human tortures are sooner or later avenged, but those of the helpless creatures go unavenged, adds to the cowardice of cruelty. The stealing of life makes a robber, and the method of that robbery gives still worse character to the act. One cannot too vividly portray the desperateness of the situation. At Christmas and especially Thanksgiving, millions of birds are strung on lines alive and plucked hanging head downward. It would be just as easy to kill them first, but the feathers are not so clean, and the mercantile element—the greed—appeals to selfishness. When the day of the Lord draws nigh there are great feasting, long sermons, and riotous eating of those souvenirs of human diabolism; and we call this religion and civilization! Hypocrisy, I term it. I call no man holy who is party in any way to a deed of evil. If I feast on a creature obtained through another's cruelty, although I saw not the deed, I am partaker in my brother's degradation, and the stream cannot rise higher than its source, however much we may strive to deceive ourselves. Hypocrisy! again I say. Like the minister who was asked to say grace over pork, and who said, "Lord! if Thou canst bless what Thou didst of old say was accursed food, if Thou wast one thing of old and of a different mind nowaday, put Thy blessing on this dinner"—like him I would say, that if God, who said "Blessed are the merciful," can give an eternity of bliss instead of woe to a vivisectionist, or

a torturer, or a cruel heart, in whatsoever form, He has changed and is not worthy of any respect. But I know the Author of life is wholly different from the ideal of the cruel hypocrite who calls Him his God on Sunday and destroys some of His most beautiful works on week days. As Garrison said to the minister who told him his God blessed slavery, "Your God is my Devil." A good many people will find that out before they get through. O magnificent retribution! This is the one fact that alleviates my suffering over cruelty of all kinds. When I think what lies before those inflicters of pain in the compensative punishment in which I most thoroughly believe, as must all philosophic students of life, my grief ceases; love of equilibrium sees justice and her sword approaching; and my pitying heart stands mute before the vision, with no plea to stay her hand. It is not always to be a helpless time for those so helpless now; and we will hasten that glad hour. Our duty is to convince the thoughtless of their sin, and then do what we can to stop it. Frances Power Cobbe says, "First make vivisection infamous, then make it illegal." It is a noble, a grand utterance; but experience proves that laws are made by wicked men to suit themselves and then enforced at their pleasure. One of the wickedest laws against birds was passed amid the laughter of the Illinois Assembly over an indecent speech, and because of it. Human laws are the work of very frail human beings. To the rescue of birds we must call something better than laws. Besides the argument I have advanced, laws framed by men alone lack the influence of women, who, though as mean and cruel as men, as a sex, have a quicker, keener discernment of right and wrong. These laws are a sort of one-sexed creation. Except to ask permission to kill, no boy pays any attention to bird laws. We must look elsewhere. The law makers amuse themselves after their fatiguing labors by killing birds or watching them killed, by those fine shots who take half-suffocated pigeons, shoot them as they strive

to fly, and call it sharp-shooting. Where I live a real-estate agent had a display of this kind, and after it hundreds of maimed and suffering birds lay alive for days on the field, though I and others tried in vain to save and heal them.

I loathe the sight of a feather in a woman's bonnet. Aye, there it is, the woman who ought to be an angel of mercy—look at her! Clad in furs, torn as seal skins are from the living creature—gloves of softest kid on her hands, taken from living baby kids so as to have them soft—feathers in her hat torn from living birds to preserve the hues more brightly, she is a walking epitome of cruelty. Trafficuses her vanity to feed the minotaur of the merciless nature of man. Alas! are such beings worthy a sigh? Why does not a righteous God destroy such a race? The few who attend this Congress are the answer. There are some hearts yet left as salt on the earth, and the savor has not totally disappeared. This is the hope, and this is the method I show you, to rescue the birds. We who study these questions are criticised; we are called cranks and fanatics, and what not of abuse. It matters not; we are working for the deliverance of birds and other sufferers, but far more important to human interests is our work, for it means moral and spiritual deliverance for man, for woman, for child.

Shall a braver, purer, stronger race replace the present? Some prophecies so strongly point this way that Lord Bulwer Lytton founded his novel of "The Coming Race" upon them. Every move we make to aid an animal is a move to enfranchise from degradation our own race. Man cannot be kind to a human and cruel to another sort of creature, and be of any real value. The principle of love must animate him toward all things, if he would be truly developed. No one can grow under any other teaching. Love! love! this is the teaching that will lead to success in our work. Filled with love ourselves toward everything, incapable of a selfish or cruel deed, let us go forward diligently to baptize the world with this Danaë rain of the purest

gold, this mighty effluence that shall cause life to spring anew under its vivifying power.

Move forward, friends and coadjutors, in this grand effort, disregarding the world's criticism, building anew, turning like Paul from Jerusalem—"lo, we also turn to the Gentiles." Long we have waited for so-called religion to aid us in the work. It has only tied our hands and mocked our teaching; or worse, followed as the Judaistic teachers followed Paul, declaring our ideas false and inculcating hideous doctrines of cruelty. Away with Conservatism! Like the abolitionists of old we must ignore the ecclesiastical whip which Conservatism cracks over our shoulders; and, as radicals of the radicals, we must begin a new march on a new way. I tell you it is of no use to go to the churches. I am a church member myself, but I find no sympathy on this subject in my church. On the contrary, on these questions my position is strongly opposed by those highest in authority. Is it not so with you? I tell you that we who seek to rescue birds must let go the old moorings and launch boldly and determinedly on new seas. We shall find the continent we seek after many days of weary work and nights of toil. We who are engaged in preaching the gospel of love, which I consider the mightiest work on earth, the key to character perfecting, shall be as Columbus; we shall stand upon a new land, and at our feet shall kneel the savage reclaimed from savagery, with the cross of self-sacrifice casting its beautiful shadow over him. Upon us, who labor in this field, shall shine the sunlight of a new world, a regenerate earth, "wherein dwelleth righteousness."

Oh! be valiant. Oh! be determined. Persist and persevere! Turn your back on the old! Face the new! "Be courageous and quit you like men." "The lions shall eat straw," and the "wolf and the lamb shall lie down together." Aye! the child shall play in the poisonous serpent's den. A little child shall lead all these once dangerous creatures, made so by centuries of persecution. "They shall not hurt

nor destroy in all my holy mountain, saith the Lord." Ecclesiasticism tells us these words point to a far distant future. It is very well for clergymen to say so over a dinner of roast lamb. Something has been burnt and destroyed that their lusts crave. Down with such cowardly halting ideas! Though Truth strip me of every precious preconceived opinion and belief, let Truth prevail! Aye! she will. Despite their halting and their contending, Truth marches forward and we who love her are in her armies. Victory belongs to Truth. Falsehood cannot win.

Stand firm, and cast fear to the winds! Look not backward! We know our cause is right. It seems to go down and sometimes to be lost; but it rises, albeit sorely wounded in the strife, and at last wears the crown of victory. When the cause is won, sorrow and cruelty are done.

Love! Labor! Courage! These shall realize our hopes, and these we summon to the rescue of birds.

The sun is rising on thy path,
Oh heart of loving strength!
The sun is setting on thy wrath,
Oh cruel heart at length!
Thou shalt go down, oh evil heart!
Thou shalt prevail, oh nobler part!

The roses twine about thy brow,
Oh heart of tears for woe!
The serpent clings about thee now,
Oh cruel heart below!
Thou shalt be glad, oh heart of love!
And rise o'er comer, all above.

The birds shall sing about thy way,
Oh heart that lovest all!
The raven croaks in wild dismay,
The cruel heart to call
Down, down to deep Remorse's cave,
But Love shall find all things its slave.

All living things do greet thee, love,
Oh Love that lovest all!
For fish below, for bird above,
At Love's feet creatures fall.
This is the victr'y, this the crown,
Love hath all sorrow overthrown.

THE COWBIRD, MOLOTHRUS ATER.

TRANSLATED FROM THE FRENCH OF PROF. ALFRED DUGÈS, BY E. IRENE ROOD.

THIS bird, named in Mexico "Tordo," seems not to migrate, for it is seen during the whole year almost everywhere.

In the city of Guanajuato they appear some time in March, and may then be seen by the hundred sitting on the cornices of large buildings and on the long roofs of the silver-smelting works. They go in pairs, live on friendly terms with the domestic pigeons, and partake of their food.

In the country the Cowbirds travel in large flocks resembling dark clouds, and their rapid flight produces a sound similar to that of a hard shower. They follow the capricious evolutions of their leader, changing at every moment the forms of their masses, and finally alight in the pasture among the cattle.

Though the Cowbird willingly eats insects and angle-worms, it prefers grain, and can be kept for years on corn mush, bread, and red pepper. It is easily tamed and becomes a great favorite, running loose about the house, singing its peculiar gurgling notes.

When one is killed the others gather around him, making it an easy matter to shoot a number.

The farmers dread them and teach their children to chase them from the newly sowed fields; for they come down in large numbers as soon as the insect supply fails, and then eat the grain. To give an idea of their numbers, I must

relate what I have seen in the country where I was spending a few days in March, 1879.

It was at the Hacienda de Tupátaro in the southwestern part of the State of Guanajuato. We were sitting on the veranda, when we saw an immense flock of these birds. All the persons present, who were well acquainted with the country, calculated that the column was about 12,000 yards long; its width about five yards, and its depth one. Each bird is about seven inches long and the spread wings measure thirteen inches from tip to tip. As they fly close to each other it is reasonable to suppose that the column numbered nine or ten millions of birds. Of course such great numbers are rarely seen together; but I have often seen flocks numbering from one to two thousand, and that several times a day.

I am one of those who think insectivorous birds ought to be protected as well as reptiles and batrachians; but I have my doubts about the Cowbird

THE ORNITHOLOGY OF COLUMBUS' FIRST VOYAGE.*

BY FRANK M. CHAPMAN.

One would suppose that the records left by Columbus of his voyage had been so closely studied by recent commentators, that just attention had been given to every circumstance which could in the least have governed the course of the discoverer. Volume after volume, essay upon essay, has been written, treating minutely of apparently every influence which could have affected Columbus' land-fall, but with one exception I do not find that historians have rightly estimated the part which birds played in the discovery of the New World. I think, however, it can be proved that from November 6th, when the Canaries disappeared in the east, until October 12th, when the Bahamas were sighted, by far the most important events which occurred to the little fleet were the visits it received from land-birds.

Columbus was not a naturalist; his mission was to discover not new species, but new worlds. As a rule, his journals are devoid of natural history incidents, but during this first voyage he was fully alive to the significance of the appearance of migratory birds; indeed, his journal furnishes us to-day with the best records we have of the occurrence of land-birds in the waters through which he passed. The finding of sea-weed or the sight of a whale was, at the best, only negative evidence of the proximity of land; but the

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presence of numerous small land-birds was a fact capable of only an encouraging interpretation.

In order to appreciate this, let us follow the record given by Irving of birds seen on the voyage. On September 14th, when about two hundred and fifty leagues from land, a heron and a tropical bird called *rabo de junco*, or wagtail, "hovered about the ship." Both the locality and the fact that one of the birds is named specifically, render it probable that these birds were Old World species with which the voyagers were familiar. When about three hundred and sixty leagues from the Canaries, Columbus records seeing "a white tropical bird of a kind which never rests upon the sea." If this bird had been a species of gull, it is more than probable than Columbus would have identified it. The fact, also, that gulls commonly rest on the water—a habit which was doubtless well known to so experienced a mariner—renders it possible that the bird Columbus here refers to was the tropic bird—perhaps the yellow-billed species, which is littoral rather than maritime, but makes extended flights across the ocean. During a recent trip to Trinidad, not long after we had crossed the track of the first voyage, on a line drawn from Bermuda to Porto Rico. I was reminded of the record of Columbus by seeing one of these birds. As the species breeds abundantly in Bermuda, it is quite possible that this bird was *en route* from those islands to Porto Rico, a flight of some eight hundred miles.

Pinzon was also fully alive to the significance of the presence of birds. On September 18th we find that he hailed the Admiral and informed him that "from the flight of a great number of birds, and from the appearance of the northern horizon, he thought there was land in that direction."

It is evident that these birds did not alight on the vessels, but were seen flying by; and we may infer, therefore, that they were purely pelagic species—presumably petrels or shearwaters.

Irving states that on September 20th, Columbus recorded the visit of several small birds to the ships: "Three of a small kind which keep about groves and orchards, came singing in the morning and flew away again in the evening. Their song cheered the hearts of the dismayed mariners, who hailed it as a voice from land. The larger fowl, they observed, were strong of wing and might venture far to sea; but such small birds were too feeble to fly far, and their singing showed they were not exhausted by flight."

We cannot now guess at the identity of these birds, but we can readily see what a source of encouragement they were to Columbus and his sadly troubled companions. For nearly two weeks they were now denied the mental comfort which their small-winged visitors had given them; this was the critical period of Columbus's voyage. His men were on the verge of mutiny, and each day his influence over them was lessened. On October 3d we find them uttering "murmurs and menaces;" but on the following day they were visited "by such flights of birds, and the various indications of land became so numerous, that from a state of despondency they passed to one of confident expectation."

They were now about twenty-one hundred miles from the Canaries, and within about six hundred and fifty miles of the Bahamas.

Finally, on October 7th, birds became so numerous, and the direction of their flight was so uniformly southwest, that they became not only harbingers of land to the explorer, but actually caused him to change his course to correspond with their line of flight. Fiske remarks: "The change of direction was probably fortunate. If he had persisted in keeping on the parallel, seven hundred and twenty miles would have brought him to Florida, a little south of Cape Malabar. After the change he had but five hundred and five miles of water before him, and the temper of the sailors was growing more dangerous with every mile." (*Discovery of America*, I., p. 430.)

Apparently each day they were now visited by "flights of small birds of various colors; some of them, such as sing in the fields, came flying about the ships and then continued towards the southwest, and others were heard, also, flying by night." (IRVING.)

Columbus' records, the location of his ships, and the time of the year, leave no room for doubt that he was now in the line of flight of North American migrants which pass the summer in the north and the winter in the tropics. No subsequent observer has given us a better record of their migration in this region.

It may with reason be asked, Where did the birds come from? The occurrence of occasional birds at so great a distance from land, particularly after severe storms, is not unusual; but how can we explain the continuous flights which Columbus followed to the southwestward. The question can be very easily, and, I think, satisfactorily answered. Long continued observation shows that the Bermudas are visited annually by numbers of migrants, which pause there to rest before continuing their journey to the south. These islands are about equidistant from South Carolina, Nova Scotia, and the Bahamas. As the only truly oceanic islands off the coast of the United States, they are a haven for wandering migrants, and they also receive regular visits from certain species.

A line drawn towards the southwest from these islands falls very near the place where, on October 14th, Columbus was first visited by migrating birds. There is, therefore, no cause to doubt that at this point he entered an established highway of migration.

So much for an explanation of Columbus' records. Now let us, in conclusion, briefly summarize the influence of birds upon this voyage.

First, as Fiske concisely shows, it was due to birds, and birds alone, that Columbus materially shortened his venturesome voyage, and thus landed in the Bahamas, instead of

continuing on his course toward Florida. The second and concluding point I wish particularly to emphasize, for it seems to have escaped the attention of annotators. The records we have so hastily reviewed leave no room for doubt that during the entire voyage no events proved a greater source of encouragement to the venturesome mariners than these flights of migratory birds; but do they not derive a new significance when we remember that the migration from the Bermudas southward is practically concluded by November 1st? After nearly twenty years of disappointment, a delay of ten days at Palos would not have seemed of much importance. But if Columbus had sailed from Palos September 16th, or, using the "new style," September 26th, he would have seen few migratory land-birds, or none. Whether, in their absence, he would have had sufficient influence over his men to force them to continue a westward course, is an open question; but we can clearly see that, without the presence of birds, his efforts at allaying their fears would have been seconded by no really conclusive signs of land.

SOME RECENT ECONOMIC AND SCIENTIFIC QUESTIONS IN ORNITHOLOGY.*

BY R. W. SHUFELDT, M. D., WASHINGTON, D. C.

ORNITHOLOGY has attained to a status to-day never before reached by that science at any time within the recollection of man, or as shown by its literature.

In this country its cultivation not only interests thousands of amateurs, but its pursuit is followed by a host of eager experts, while its economic value has not altogether been overlooked by the government, which annually makes an appropriation in support of a department dealing with ornithological questions as related to agriculture. Regarded as the science is, then, from so many varied standpoints, it is not at all surprising that we find the collecting of birds actively undertaken for a great variety of purposes. Some of these are perfectly justifiable and fall strictly within the demands of the science and are essential to its progress, while others lie more or less without the pale of any such need, and consequently are deserving of our most energetic condemnation or prosecution. Thousands of birds are destroyed every year as a mere matter of sport, and either no use made of them whatever, or none worthy of mention. In this category, of course, I do not include the killing of game-birds for the table, a privilege that can be properly restricted legally, although it is very frequently more than abused. Many native birds are annually trapped for cages, and a

* First published in Science, Vol. xxii, No. 562, Nov. 10, 1895, pp. 255, 256.

large proportion of them perish. Quantities are destroyed by "feather-hunters" to supply the demands of fashion. Numbers are killed by ignorant farm-hands, who labor under the impression that they do humanity a direct benefit every time they take the life of a King-bird, a Martin, or a Marsh Hawk.

Then there are a few taxidermists who habitually destroy birds as a business, to preserve their skins and mount them for sale. As a rule, however, taxidermists are engaged only in the preservation of such birds as are brought to them, or else pursue their profession in scientific educational institutions or elsewhere.

Next we meet with every grade of amateur and scientific collectors of bird-skins, who claim each year a certain proportion of specimens for scientific or semi-scientific purposes. In nature, also, some species prey upon others and thousands are thus annually destroyed, while every season the lives of millions of others are claimed by storms, high winds and downpours of heavy rain. Certain predatory mammals capture others, or reptiles devour their young. No doubt, finally, that diseases, injuries and accidents take away their annual quota, but the proportion thus destroyed must, in comparison with other causes of mortality, be exceedingly small.

Now for a number of years past it has been widely noticed that in the suburban districts of many cities all over the United States, there has been a more or less marked decrease in numbers of many of our native birds, as, for example, Orioles, Robins, Blue-birds and many other species. Frequently such reports are only too well founded in fact, while in other cases they have been over-rated. Certain it is, nevertheless, that within the last twenty years birds in the most of such localities have been becoming more and more scarce, while in some places where certain species were formerly abundant, those very species are practically now almost extinct. Numerous inquiries, scientific and otherwise,

have been made with the view of finding out, if possible, the cause or causes which are accountable for bringing about this very undesirable state of things. After more or less mature deliberation some attributed it to one cause, some to another, and some to a combination of causes. Many were disposed to believe that the introduction of the English Sparrow lay at the bottom of the whole trouble; in the eyes of some the "feather-venders" had all to do with it, while from other quarters the blame was attached entirely to the taxidermists and the bird collectors. As far as the writer has seen or heard not much importance has ever been attached to any other cause as a means of destruction of bird-life, with perhaps the exception of the introduction of large lighting apparatuses in many places, where no doubt thousands of birds at night are yearly destroyed.

For more reasons than one the introduction of the English Sparrow into this country was an expensive blunder, but that they are chiefly responsible for the disappearance of many of our native species of birds in the localities we have mentioned, I never have in that view been a firm believer.

That the indiscriminate slaughter of small birds for millinery purposes, by conscience-ridden dealers, was for a long time a prime cause has been proven beyond cavil, and such people should simply be prosecuted by all the rigor of the law, and made to desist quite as promptly as that party who would commit any act that threatened the agricultural interests of the country, for no one will question for a moment but what the removal of our insectivorous birds does that very thing. Were all the birds in the country destroyed there is no power known to man that could check the enormous increase in insect-life or the destruction of plant-life that would follow as a consequence. Such a wholesale disturbance of Nature's balance will not occur; while on the other hand I am not prepared to say whether the recent known decrease in our birds in certain localities has been followed by a corresponding increase of any particular species of

noxious insects. That is a point for the entomologist to decide for us.

What comparatively few birds are gathered in for scientific purposes, I am strongly of the opinion, has but very little influence either one way or the other upon bird increase or decrease. Take a city like Chicago, for example, and its extreme suburban environs; how few, indeed, in proportion to her population, are there of her inhabitants who collect in the neighborhood birds for scientific purposes! In the course of a collecting season how many young scientific ornithologists in Chicago go out into her suburbs to collect birds? Not in any sufficient numbers, I warrant, to have any material effect upon the decrease of native birds. The same suggestion is applicable to other large towns and cities in the United States and Territories. When one comes to think of the millions of birds that pass over the country during the vernal or autumnal migrations every year, and then comes to compare that host with all that has been deducted from it during the last century, as represented by all the birds actually existing in scientific collections, the loss is hardly worthy of mention. Moreover, more than half of our scientific avian collectors do not collect in the suburban districts but go far from the habitations of men, and so their work cannot be said to affect the question at all.

But there is a cause in my opinion, however, for the scarcity of our native birds in and about cities and large towns of this country, before which all other reasons we have mentioned stand absolutely aghast. It is the wholesale destruction carried on by the army of unscrupulous small boys in any particular place. I am the more convinced of this from my observations in and about Washington, D. C., during the past four years. This active destruction has been made possible by the numerous comparatively recent and cheap inventions in the way of air and spring guns, as well as cheap rifles of small calibre, also other fatal contrivances that will noiselessly throw missiles of a variety of kinds with great

accuracy. Hundreds of those guns are sold annually to boys, and the latter never seem to tire of strolling about orchards and hedge-rows and knocking over dozens upon dozens of birds with them. One day last spring I met one such youngster, and upon examining his game-bag found it absolutely crammed full of dead birds which he had killed since starting out in the morning. One item alone consisted of seventy-two Ruby and Golden-crowned Kinglets. The same fellow boasted of having slain over one hundred Cat-birds that season. Boys get to be wonderfully expert shots with the kind of guns to which I refer, and as the ammunition costs little or nothing, and a great quantity can be carried at a time, it is easy to be seen that between the wholesale slaughter they can and do commit, in addition to keeping the remaining birds perpetually alarmed, it is no wonder that they are soon driven away from the neighborhood of our cities and country seats.

There are ample legal measures within our power to enforce, to prevent this cause of bird decrease, especially if the fathers of those boys are held responsible, and I would suggest that it be the sense of this Congress that such measures will be recommended to the various State legislators hereafter that will have the tendency to thoroughly discourage such practices.

THE MIGRATION OF HIRUNDO RUSTICA TO SOUTH AFRICA.

BY DR. EMIL HOLUB, VIENNA.

It is commmonly known that the European Swallow winters in Northern Africa, but it may be known to few that by far the largest number of this species migrate to the southern portions of the Dark Continent.

Every year, from October to March, through the eleven years of my sojourn in South Africa, and in the very midst of the southern summer, I have seen these Swallows hunting up and down the endless plains, destroying vast numbers of the myriads of southern insects, and uniting every evening into swarms of thousands, in some spots of hundreds of thousands, to seek their resting-places for the night.

In the following I will refer to one of those sleeping-places, asking the kind reader to accompany me to that lonely spot, visited by me on a day in November twenty-five years ago. We are in the midst of an endless plain. Toward the east, hardly perceptible by its treeless banks, the Harts Spruit* takes its southwesterly course to the Vaal River, a right-hand tributary of the Kai Gariep or Orange River, the latter in its lower course being a natural boundary line of Cape Colony toward the north. The grassy cover of the plain is about

* A spruit is a river flowing after heavy rainfalls for a few days or weeks only; most of the year such a river is dry, with the exception of some of the deepest places in its bed, which contain water for a few months.

one yard high, and the slender stems of this high grass, waving to and fro in the northwesterly breeze, are interwoven with numerous blossoms, showing all the colors which form a rainbow's beauty. Everywhere on the immense flat, bounded by the blue sky of the horizon only, whereto we turn our eyes, and plainly to be seen from the small hill, an elevation formed by the white alluvial karoo tuff-stone, herds of game are visible. Large troops of the blessbuck (*Damalis albifrons*) are quietly grazing; small herds of the black gnu (*Connochætes gnu*) are here and there enjoying their circular runs, the latter to hunters known as "wildebeest dances." But most numerous of all are the graceful springbucks, *Antidorcas euchore*, which in herds of hundreds in all directions are to be seen; many of them, unruly in their playfulness, leap up eight feet above the ground, bounding one over the other.* Among the antelopes and gnus, Cranes, single as well as in pairs and troops of fifty or more, are walking up and down, feeding upon the numerous locusts and upon the white ants—the nests of which latter, about two feet high and hemispherical, or in the form of tubes two to four feet high, are to be found in hundreds of thousands upon the Harts and Mo-lapo Spruit plains. †

Just in front of us and down below in the grassy plains the dark waters of a large pool glisten and quiver in the reddish shine of the subsiding sun. In its centre, this being the orifice of an underground cave, common to the dark-gray dolomite formation of these plains, the pool is of very great depth; otherwise it is shallow in its greatest extent, and such places are overgrown with a thicket of tall, rustling reeds. One of these abodes forms truly a centre of bird-life in the immense plain, so large in extent as not to be overglanced by the human eye, not even from the elevated position which we are occupy-

* The gnus and blessbucks have since been annihilated; only a few springbucks remain.

† In this portion of southeastern British-Bechuanaland since the 18th of November, 1895, incorporated to the Cape Colony.

ing. This marsh, about 900 yards in diameter, with a deep rocky cavern in its centre, is worthy of the admiration of mankind; it is a place offering any amount of important observations upon bird-life to every lover of natural science, but it is especially attractive to an ornithologist who wishes to learn and to study, and who does not come to destroy birds and thus make his visit a mercenary matter.

The marsh is inhabited by numerous birds. Many species of singers and Finches, many more of wading and swimming birds, nest among the tall reeds, making this only marshy thicket in the vast plain their home for the whole year through; but there are others, like the European Swallow, different kinds of Herons, Storks, Cranes, and other *Grallæ*, *Plectropterus gambensis* and the Egyptian Goose (*Chenalopex ægyptiacus*), which pour in toward the night only, selecting this lonely spot to be their dormitory for the few hours up to the dawning day.

I consider the few days which I spent on the banks of this pool as some of the happiest ones which I experienced during my first African exploring trip of seven years' duration; but one thing which I do deplore is that, having no boat, I was not able to explore the centre of the dark waters and those many small islands, formed of floating rushes and broken-down reeds, which are the real nesting-places of numerous pairs of *Fulicula*, and several species of *Anas*, *Dendrocygna* and *Querquedula*.

It is just an hour before sunset. In the reeds below, the great noise produced by so many feathered inhabitants keeps on, as during the whole day. Conspicuous more than others are the hundreds of pairs of bright red Finches (*Pyromelana sundevalli*) watching their nests, and having used two or three close reeds as pillars for each of them; different species of yellow-tinted Weavers (*Ploceus* and *Hyphantornis*) are the next ones audible with their voices; in which chorus a few troops of the beautiful Kafir Finches, the nicest South

African Finch, merrily join. The male of this bird (*Chera procne*) adorns itself during the breeding season with a velvet-black coat, scarlet epaulettes, and an elongated tail, over a foot long, though the body of the bird is only about as large as that of a Thrush; the female being dressed in a darker and lighter shaded brown, the same color the male assumes during the winter, denoting its sex by the faded epaulettes only, which mark so brightly the black festive summer coat. All the noise made by these *Passeres conirostres* in unison with the whistling and the songs of real *Oscines* (*Salicaria*, *Sylvia*, *Pratincola* and others), and interrupted by the shrieks and squabbles, more or less loud and shrill, of the *Grallæ* and *Natatores*, offers a natural concert of a peculiar kind, hardly to be reproduced by the human tongue or by the most skilful pen. For moments only, when the rapacious *Milvus ægyptiacus* throws a shadow from his large wings upon the waters, the cries of love and enmity cease, to be renewed with the same vigor as soon as the rapacious bird of prey has disappeared. From all sides, from near and far, one by one, in pairs, in whole families, and in long lines or wedge-shaped arrays, Stanley Cranes (*Tetrapteryx stanleyanus*), the beautiful Kafir or Crested Cranes (*Balearica regulorum*), and many species of Herons, the small and large white, the gray, the purple, the black-necked, and the Goliath, (*Ardea garzetta*, *A. egretta*, *A. cinerea*, *A. purpurea*, *A. atricapilla* and *A. goliath*), also white and black Storks (*C. alba* and *C. nigra*), are returning to their sleeping-place. Wild Geese and Ducks, Plovers (*Chettusia coronata*, *Hoplopterus speciosus* and others), even a pair of Hammerkopfs (*Scopus umbretta*), which all kept the whole or a part of the day in the vicinity of the marsh, are now coming along, walking slowly and still grazing like the geese and ducks, or running and playing (like *Chettusia coronata*), or taking short flights, all claiming a place in the waters of the pool. In other parts of South Africa, where no marshes are to be found, but large and very shallow salt

lakes,* all the wading and swimming birds of the neighborhood flock every evening to these waters, so as to avoid nightly attacks of the many small robbers, as jackals, hyenas, earthwolves and polecats, which infest these plains of the South African high plateau.

During these observations of ours an hour has passed; the sun's golden disk is just touching the western horizon; in the east the shadows of the coming night are visible. As our eyes glance over the blue sky above, adorned here and there with a few light, feathery clouds, glad in the golden-crimson of the sun's last farewell greetings, we perceive in the far distance, near the horizon and on all sides, a few darkish spots. Is it a delusion or not that they come nearer? We look hither and thither and it seems as if these spots become larger; they appear to approach. And they *are* approaching; they darken and are rapidly increasing in their breadth. Are they not swarms of locusts? Locusts? Hardly possible! No, they are not these ravenous insects. The locusts come with the wind and pass over in a single dark cloud, darkest just above the ground; but those approaching clouds come from all directions. Some fly very high in the air, others from twenty to fifty yards high, others again move—as you can see—along the wavy grass; and suddenly this one cloud—now surely it is a swarm of birds—swerves aloft. Birds! Behold,—are they all birds, these approaching clouds? Yes, they are, and, to our great surprise, small, dark birds. We watch two of these large swarms, which from due north are making straight for us. They pass abreast for a few moments; suddenly the one to the left turns high up, lowers itself just as suddenly, and now both swarms, turning toward each other, have united in

* Up to several miles in diameter, and from one to two and a half feet deep in the centre, some with a few sweet water springs on their banks. They are everywhere in country which has no communication with the ocean, and are commonly called "saltpans," being the lowest places in southern portions of the high plateau—the reservoir for rain-water.

a single great cloud. Wherever we look the swarms are fast approaching; the grand sight of the confluence of two multitudes of birds just witnessed repeats itself on all sides. Quicker, dear reader, than I am able to express to you in words, most of these living clouds, at times overshot with a gleam of reddish sheen, the reflection of some real clouds still beaming in crimson on the far western horizon, have united in ten large swarms—no, in eight only; and look, they are still uniting! Our cries cease; we remain silent for a few moments, and then a loud cheer rings through the air. The endless swarms of *Swallows* have united into a single mighty cloud. Who could count them? The air is filled with them and with the noise they make with wings and voices. The swarm of more than hundreds of thousands moves up and down, to and fro, lowering itself quickly down to the reeds and rising just as swiftly high up into the air; it moves like a living tidal wave and sounds like the rushing of mighty winds. And the voice of those countless feathered singers expresses their pleasure at having met again at the place of their night's rest, which they have visited for weeks already and to which they will nightly resort for four months longer before departing for the far north.

The faded crimson on the western sky has disappeared. The evenings on these high African plateaus are very short. The night is fast approaching. Still the living, dark and noisy billow rolls up and down, a little less voluminous than before, as thousands have already joined the whistling Finches among the reeds. Suddenly the wave subsides, and turns sharply toward the grassy plain, as if it would leave the swamp for good; but just as suddenly it returns in a semicircle and striking the reeds sinks among them, not to rise again. The voices still keep on; no wonder that disputes arise among the Swallows themselves and also with the Finches regarding about three inches of space on the same reed stem. This noise keeps on for about a quarter of an hour, when it ceases. At last the weary birds have found a place

to rest, and soon they are asleep. But do not think, dear reader, that with the retirement of the Swallows every sign of life has ceased in the dark marsh for the night. Though the night has set in, we soon hear peculiar low tones coming from the thicket of reeds. We hear the melancholy song of the Sylvias, the voices of the Night Herons and of the Bitterns, and from time to time the gurgling cry of the sentinel among the gray Cranes mingles with them, generally followed up by the cries of the whole troop of Cranes. Another Crane takes the watch until his cry again puts these large birds on the alert against the sly attacks of hyenas and jackals.

The day is dawning. The song of the gray Sylvias and the Bittern's loud boom are soon drowned in the noise of the hundreds of thousands of Swallows which have just awakened, and in the loud cries of the large birds, which try at first a walk on the moist bank of the swamp, before they leave for the plains. Our friends, the Swallows, rise after a good deal of squabbling about the dreams of the night past; they leave in small swarms—as I think, those coming from certain European districts keeping together for the whole time of their African sojourn—and make at once for the different portions of that endless plain, on which they are accustomed to hunt day after day. But they do not rise high up in the air to fly in any particular direction; taking the proper course at first, they commence at once to search for food, reaching their proper hunting-field—may it be near or very far off—by thus flying low along the high grass, and taking with their breakfast the glittering drops of the morning dew to quench their thirst.

Who could count the millions of insects the swarms of Swallows which rest at this one marsh destroy in a single day on that South African plain? Count now all the sleeping-places; count now all the swarms of this most useful bird; consider also the number of days of our winter, during which the Swallows remain in the far south; and if

you have never before meditated on a small bird's life, you will acquire a new notion: that you harm yourself and your children if you injure this true small friend. You will then recognize in yourself a protector not only of the Swallow but of all useful birds, which were sent into the world to do good to mankind, and are therefore not to be killed for vanity's sake.

ORNITHOLOGISTS, PAST AND PRESENT.

BY PAUL LEVERKUHN, M. D., EUXINOGRAD CASTLE, BULGARIA.

Corresponding Member American Ornithologists' Union.

In the following lines I shall endeavor to give some notes on my collection of ornithologists' portraits, which is said to be the richest one in the world. The reader will perhaps cry out, that it is a curious idea to make a collection of photographs of naturalists, instead of their books, or better, of the natural objects themselves. But to my mind it is very interesting to know the physiognomies of scientific men, who smoothed our paths, who stepped further on the difficult way of exploration, and who succeeded in obtaining the most remarkable results. So I began to form an ornithologists' album, besides collections of specimens of natural history; and I am happy to state that my collection now surpasses all others.

As the arts of photographing, daguerreotyping, wood-cutting, and lithographing were not known in the time of Aristotle and Pliny, it is not astonishing that portraits of birds alone exist for that period; and, I regret to add, they are of very dubious origin. But we are accustomed to date our science from these ancient times; therefore, it is absolutely necessary to begin with them. Then a long while rolls by without record. In the middle ages we find the celebrated Konrad von Gesner of Zürich, Ulysses Aldrovandus, Albertus Magnus, and Olaus Wormius—the latter being the first ornithologist at a prince's court. The portrait of

Gesner is not a rare one, as there are about ten different editions. A little later we are glad to name Carolus Linnæus, followed by his editor, Johann Friedrich Gmelin, at different times in his life; and by his contemporary Philip Ludwig Statuis Müller. About the same period one of the first oölogists, Jacobus Klein, author of Stemmata Avium and Historiæ Avium Prodromus presents himself to our researches. In England, ornithological science commenced early, if we admit the reports of circumnavigators and other travellers, such as Captain James Cook, Forster,* etc. Among the old British authors represented in the collection it would be well to call attention to the two Macgillivrays, Thomas Bewick, John Johnston, Thomas Pennant, and John Ray, each celebrated for large folios, the titles of which are found in President Elliott Coues' remarkable work entitled: Instalments of Ornithological Bibliography, though his portrait is wanting in my gallery! William Yarrell and his editors, Howard Saunders and Alfred Newton, are represented in different shapes. As we speak of England, we will name also such stars of to-day as Philip Lutley Sclater, R. Bowdler Sharpe, H. E. Dresser, Rev. H. A. Macpherson, Colonel H. H. Godwin-Austen, and Wardlaw Ramsay.

In returning to the olden times we must not forget to mention such famous authorities in France as Georges Louis Leclerc Buffon, Pierre Bélon, Georges Léopold Chrétien Frédéric Dagobert Cuvier, Bernard Germain Étienne Lacépède, Jacquin, and L. P. Vieillot. The renowned inventor of the thermometer, René Antoine Ferchault de Réaumur, was an industrious lover of nature, who endeavored to help his poorer brethren, such as bakers, to profit of nature's

* The writer of this paper does not give Forster's full name, and therefore we are left in doubt whether he means Johann Reinhold Forster (1729–98) or his son, Johann Georg Adam Forster (1754–94), both of whom accompanied Captain Cook on his second voyage in 1772.—E. C.

riches. He built several different ovens for hatching chickens, which baked simultaneously cakes and bread. The well-known English surgeon, Edward Jenner, who was the inventor of vaccination, took special interest in the natural history of the Cuckoo (*Cuculus canorus*) and published some observations on this subject which are still of value.

Many physicians are famous naturalists. Everyone knows Sir Thomas Browne's Pseudodoxia Epidemica, in which curious old volume plenty of interesting and extraordinary novelties are treated. In Germany we can refer to the excellent anatomist Chr. L. Nitzsch, the first who wrote on pterylography; the Hanoverian, Johann Friedrich Blumenbach; Dr. C. G. Giebel, author of the Thesaurus Ornithologiæ; Dr. Fr. Tiedemann; Dr. Gustav Hartlaub of Bremen and Dr. Otto Finsch, who edited works together; Kutter, who possessed one of the finest egg-collections in the world; Reichenbach, the late director of the Dresden museum; Zürn, the poultry man; in Switzerland, Herr von Tschudi, author of the often re-issued Thierleben der Alpenwelt; Girtanner, the monographer of the Lammergeyer (*Gypaëtos barbatus*) and of *Capra ibex;* C. Stölker of St. Fiden, who studied the pathology of birds; in France, Geoffroy Saint-Hilaire * and Milne-Edwards †; while in Italy and Spain the names of H. Giglioli, Schiavuzzi, Azara, and others are known to everybody who studies, bird-life. Besides these naturalists, many ornithologists of our days have made this science their only and favorite study. But as much money is required to carry out these studies many of them are at the same time merchants. The well-known author of The Birds of Europe, Henry E. Dresser, finished his works after

* The writer does not state whether he means Étienne Geoffroy Saint-Hilaire, or his son Isidore, both of whom were eminent French zoölogists.—E. C.

† There were two of this name, Henri Milne-Edwards, and his son Alphonse; we are uncertain which is meant.—E. C.

having closed his business windows. Symington Grieve composed his excellent work on the Garefowl (*Plautus impennis*) at night. The brothers P. and A. Wiebke of Hamburg compiled their valuable collections of hybrid and abnormally colored birds after supper, being all the year round and all day long in business in the great German emporium.

There are also many ornithologists who live upon the little resources nature gives to her lovers. We speak of dealers in objects of natural history. Without naming the wretched people who take every bird's nest they find, we only mention the more generous and scientific merchants, as Schlüter of Halle; Möschler, father and son; Schaufuss of Dresden; the brothers J. and E. Verreaux of Paris, and others. Naturally they are also often importers of living animals, as Jamrach, the Hagenbecks, and Köhler—the latter being the first who introduced the red partridge (*Caccabis clappertoni*) from South Africa. On the other hand, there are many collectors and amateurs who would never be willing to dispose of their collections; and who, during a long life, amass a large quantity of precious specimens which afterward or several generations later, are usually deposited in a large town or in a public museum. The old Wormius, the patriarch Seba, Schäffer, and many others, are known to modern students by their museums. To-day the museums of the Heine family in Germany; of P. L. Sclater and Osbert Salvin, in London; of Count Turati and Count Hans von Berlepsch, are well known; and not less so is the enormous series of specimens collected during a life's leisure by Allan Octavian Hume in the Himalayan mountains, now in the British Museum. But as the greater part of mankind has not the dollars required for founding a large museum, many others are content to be conservators or directors in public museums. We can mention thus the names of many systematic ornithologists, such as H. Lichtenstein, Dr. Jean Cabanis, and Dr. Anton Reichenow,

of Berlin; August von Pelzeln, of Vienna; Leonhard Stejneger, of Washington; J. V. Barboza du Bocage, of Lisbon, Dr. M. Menzbier, of Moscow; and others. As a member of a museum one has often a good opportunity of making a scientific voyage—compare the life-histories of Th. Von Heuglin, Dr. J. Büttikofer, Meves, and the long series of travelers who published reports on such voyages as those of the Coquille, Beagle, Erebus and Terror, Astrolabe, Novara, Challenger, Plankton, etc. We may add those travelers who made their long voyages in the discovery of unknown countries, *Voilà*—a long list of African explorers, many of whom were sacrificed to science: Edouard Rüppell, François Levaillant, R. Vierthaler, Baron J. W. Von Müller, Brehm, Fischer, Emin Pasha, and others. Photographs of many of these men are very rare, and I am the happy owner of the only copy of a portrait which exists of poor Vierthaler, who traveled with A. E. Brehm, and was drowned in the cataracts of the Nile.

The field ornithologist knows no danger; he climbs the highest pines, he traverses the darkest forests, he crosses the largest seas, and he suffers any illness, fatigue, or hardship incident to his enterprises. We see the old Halmgrimsson in the cold meadows of Iceland, E. L. Layard among the Boers of South Africa, F. H. Von Kittlitz circumnavigating the globe, and Brüggemann mounting the unknown hills of Jara. We admire the energy of Dr. Gustav Ferdinand Radde and Schrenck on their explorations in Russia; of John Wolley, who thrice left comfort and civilized life to find the eggs of the Waxwing (*Ampelis garrulus*) in the desert plains of Finland, and we are happy to accompany, in reading their interesting sketches, the travelers, T. H. Krüper to the old God's home, Olympos; Brehm to the vast tundras; Schauer to the retired Karpathian mountains; N. Severtzoff in the Transcaspian and Uralasian countries; and Père David among the Chinese. Other travelers are fortunate enough to be able to spend their

holidays in making excursions and voyages, and who give the consommé of their impressions as a new fruit of their leisure. Of such are the Germans, Dr. Rudolf Blasius and Dr. Bolle, and a great many rich English amateurs, as Henry Seebohm, Scott Wilson, Aplin, and others. There are only a few whom birds nourish without their being dealers in objects of natural history. I will speak of the custodes or directors of ornithological cabinets, as Prof. William Blasius of Brunswick, who is also professor of botany; Prof. Nehring of Berlin, also teacher at the agricultural school of the university; C. Hart Merriam at Washington; Pycraft at Oxford, and others. The proprietors of oölogical and ornithological museums, as Count Dzieduszycki, the late Lord Tweeddale, Baron Rothschild, the late Mynher Van Wickevoort-Crommelin, are of course in a more suitable position.

As ornithology comprises all the different degrees between a schoolboy of twelve years of age, collecting the birds eggs of his home, and the learned old professor of anatomy and physiology in an ancient and celebrated university, my album contains types of every different kind, the single word "Birds" uniting all.

Science unites the inhabitants of palaces and huts; the elder Naumann, a poor peasant at Diebzigk, claims with the same right the name of ornithologist as the mighty Crown Prince of Austria or the Prince of Canino. Likewise within the limits of this science what a difference there is between such universal minds as Louis Agassiz, Alexander Von Humboldt, or Peter S. Pallas, and the legion of local faunists. Of the latter we name only a few: Count Alléon, for the shore of the Bosphorus; Bailly for the wonderful valleys of Savoy; Bonizzi and Bonomi for hot Italian spots; Borggreve for the harsh climate of northern Germany; Crespon, Gadeau, Lescuyer, Olphe-Galliard, Jaubert for les richesses du midi de la France; the Dubois family for Belgium; Dr. Victor Fatio for Switzerland; Keller and Finger for

Austria; Gadamer for the melancholy plains of far Sweden; Hagerup for the snowy camps of Greenland; Brusina for the rich Slavonian morasses; Mojsisovics for those of Southern Hungary; Baron Droste for the poetical island of Barkum; and the long company of untiring explorers of the empire of India: Edward Blyth, W. E. Brooks, B. H. Hodgson, John Gould, T. C. Terdon, Przwalski, Stoliczka, and many others.

I must say for my excuse that in this short article, written in haste at a distant point of Bulgaria, without any books, and only from memory, by no means all those are enumerated who are represented in my gallery; and on the other hand, that there are many stars of whom either no portrait exists, such as Gilbert White of Selborne, or who are not yet represented in my collection, as for example many American authors. I should be very glad indeed if any of my transatlantic brethren would, when reading this modest memoir, fill up the gap.

At the end I give a list of all my portraits, except those contained in Anatol Bogdanow's large work, Scriptores Rerum Naturalium Rossici, printed for private circulation, in the Russian language, in which not less than 300 Russian naturalists figure.

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*Stoliczka.
Stölker.
Strickland, 2.
Ström.
Sturm.
Sundevall.
Sundström.

*Tamássy.
*Tancré.
Targioni.
*Taschenberg.
Taylor, 2.
Temminck, 2.
Thiemann.
Thienemann, 3.
Tickell.
Tiedemann.
Toussenel.
Tschudi, v.
*Tschusi, v. H.
Turati de.
Tweeddale, 2.

Urville d'.

*Valentinitsch.
Verreaux, C., 2.

Verreaux, J. P.
*Vian.
Vieillot.
Vincelot.
Vierthaler.
Völschau.

Wagler.
Wahlberg.
Waldheim Fischer v.
Walter.
*Wangelin v.
Wendt.
*Werner.
Westhoff.
Wickevoort-Crommelin v.
*Wredemann.
*Wiepken.
*Wiese.
Wilson.
Wissmann.
Wodczicky v.
Wolley.
Wormius

Yarrell.

Zander.
*Zeiske.
*Zürn.

Three hundred and eighty-seven different authors, and 4 monuments, etc., in 515 different views; add some hundreds represented in the photo in elephant-folio of the first International Ornithological Congress held at Vienna in April, 1884, and in the above quoted Russian work.

THE END.