Our Common Cuckoo

and other Cuckoos and Parasitical Birds.

ALEXANDER H. JAPP, LL.D., F.R.S.E.

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OUR COMMON CUCKOO.

EGG ON BACK OF CUCKOO BEFORE RISING.

OUR COMMON CUCKOO

AND OTHER CUCKOOS AND PARASITICAL BIRDS

AN ATTEMPT TO REACH A TRUE THEORY OF THEM BY COMPARATIVE STUDY OF HABIT AND FUNCTION

WITH A THOROUGH
CRITICISM AND EXPOSURE OF DARWIN'S VIEWS
AND ROMANES'S VIEWS
AND THOSE OF THEIR FOLLOWERS.

BY

ALEXANDER H. JAPP, LL.D., F.R.S.E.

AUTHOR OF "HOURS IN MY GARDEN;" "THOREAU: HIS LIFE AND AIMS;" "ANIMAL ANECDOTES ARRANGED ON A NEW PRINCIPLE;" "ANIMAL TRAITS;" ETC.

WITH VARIOUS ILLUSTRATIONS

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PREFACE.

ALL the district round a little house in the country, to which I removed from London, now getting on to twenty years ago, abounds with cuckoos, as well as with nightingales. I was thus led to pay more attention than I had before done to both these birds and to two others, to which I do not here at all refer. I have lain half-days in woods and coppices to watch and observe as best I could the ways of the cuckoos, and in doing this I could not help seeing other things; and sometimes I have been so struck with what I have seen that I became very anxious to know in how far other observers had witnessed the same or similar occurrences.

This led me on and on, in a wide track of reading and inquiry, till I found myself launched on a piece of big and rather difficult research about the various different cuckoos in Europe and further afield, and even about other parasitical birds. I was constantly forced on attempts at comparative survey, and the endeavour to form sufficing theories, based on rational explanations of habit, or, at all events, working hy-

potheses. Some of the results of these endeavours are presented in this volume, which, if it has no other value, may claim this: that it describes, as far as I can, observations and enquiries undertaken with a desire for knowledge only, and to satisfy myself, and with no notion of writing a book.

The question may well be asked: why, then, do you write a book? My answer is that science is surely aided by any demonstration of unity in type or tendency where before only differences and varieties were observed and distinguished. Since, I believe, against some great authorities, that our common cuckoo *(Cuculus canorus)* is far more intimately related to the two best-known American cuckoos and to several others of India and elsewhere than has yet been demonstrated, I crave for permission to put my demonstration before those who may be presumed to be interested in it, and to leave the matter with them. I have scorned no pains to make it complete.

The reader will find as he proceeds that the single species—our cuckoos—soon leads to questions of larger interest — questions, indeed, of the highest scientific interest, in which not only birds, but many other species are more or less involved.

I have to thank Dr. Bowdler Sharpe and Mr. Saunders at South Kensington for aid, and Mr. E. Bidwell for much ready assistance; Dr. Richard

Garnett, of the British Museum, and Mr. Waterhouse and Mr. Trigg, of the Zoological Society, for such service as I can but feebly thank them for: by their readiness to oblige, I was able to consult several things which I had failed to find either at the British Museum or at South Kensington. I must record also my gratitude to Dr. A. Russel Wallace and Canon Tristram for answers to letters, and I must not omit to add Professor H. O. Forbes and my old friend and correspondent, Mrs. Bishop (Isabella L. Bird) for friendly replies—both full and ready—about cuckoos in the Far East, etc.

The work of Mr. John Craig and Mr. J. Peat Millar, of Beith, in securing a series of photographs, showing the young cuckoo in the most striking stages of his work in turning out eggs and young birds, could not but be most interesting to me as supplying exactly what some sceptics, among them Dr. Charles Creighton, in *Vaccination and Jenner* and elsewhere, had repeatedly and triumphantly demanded. I have in my hands copies of the whole series; and I will here give notes as sent to me in explanation of them by Mr. Peat Millar:

No. 1, shows attitude taken by the young cuckoo when the other young bird was put into the nest by Mr. Craig.

No. 2 was taken five seconds later, and shows the young bird fairly on its back, and the cuckoo beginning to rise.

No. 3, shows the young bird still on the cuckoo's back—the cuckoo well up in the nest; taken five or six seconds after No. 2.

No. 4, shows the cuckoo right at top of the nest—the other young bird at first slipping off its back. You will in this one notice that the cuckoo has its wings extended, to keep the bird on its back from rolling back into the nest.

[Nos. 3 and 4 were reproduced in *The Feathered World*, and are now, by the kind consent of all the parties concerned—Mrs. Comyns-Lewer, Mr. Craig, and Mr. J. Peat-Millar—here printed at p. 28.]

No. 5, shows the young cuckoo settling down in the nest, after having finished his murderous work.

[I am sorry to say, adds Mr. Miller, that the young bird in No. 5 is rather indistinct, owing to the fact that, when it was thrown out of the nest, it was out of the actual focus of the lens.]

No. 6, taken at a different time, shows the young cuckoo with the egg in the hollow of the back.

No. 7 is a snapshot of the cuckoo, after having reached the age of ten or eleven days, living in perfect harmony with another young bird, which Mr. Craig had put there with the view of trying the experiment. They had apparently found the nest too small for them, and they were lying snugly ensconced close together in the soft grass at the side of the nest. In that position this photograph was taken.

[This goes further to prove that the young cuckoo, in about eight or nine days, at furthest, loses completely the impulse to throw out what is beside it.]

[No. 6 is given as the frontispiece to this volume, and No. 7 at p. 45, with many thanks to Mr. Craig and Mr. Peat-Millar, for freely and cordially giving me permission to use them.]

My book was finished and partly printed before the news of this achievement reached me; but I have made room for the leading facts which settle so much that was in dispute before, and some passages which might have disappeared or been remodelled had I had these facts sooner before me, are so far explained in the light of this statement.

These photographs—the whole series or any one of them—may be procured from Mr. J. Peat-Millar, Braehead, Beith, Scotland, at a moderate price, and doubtless there are many ornithologists and students of natural history who would be glad to procure them.

Since this book was printed, Mr. Dewar has furnished us with another testimony to ejection of young by the cuckoo-nestling:

"A friend tells me that he saw a young cuckoo, after much exertion, turn out some young hedge-sparrows. When he replaced one of the birds in the nest, it was again ejected by the cuckoo." *

I have also heartily to thank Mr. J. H. Gurney for the use of two illustrations, and for other aid readily given.

ALEXANDER H. JAPP.

* *Wild Life in Hampshire Highlands*, p. 88.

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PART I.

STRANGE POINTS IN LIFE HISTORY OF *CUCULUS CANORUS*: OUR COMMON CUCKOO.

OUR COMMON CUCKOO

AND OTHER CUCKOOS.

I.

ABOUT no bird, which in a sense is well known and familiar, is there more mystery than about the Cuckoo. Early poets, who were impressed by two things about it — its arrival almost in the fore-front of the great army of migrants in the opening of spring, and its peculiar call (heard almost everywhere while yet the bird is comparatively seldom seen)—have celebrated it and idealized it. Wordsworth finely called it a "wandering voice," and Michael Bruce, whose beautiful poem, like a cuckoo's egg, was by Providence

dropped into another bird's nest—that is, found a father in the Rev. John Logan, who appropriated it, but only in the end to lose by his mean action—named it "the messenger of spring." Had these poets known what later observation has revealed about the cuckoo and its ways, they might have been less effusive, though, perhaps, they would have had their answer in justification ready. They would have said that they had to do with the impressions made on an imaginative mind by the cuckoo's note, which revelations of science, however adverse to the bird's character in certain respects, could never modify as regards the possibility of poetic impression. A later poet, who, it is to be presumed, knew all about the cuckoo, yet wrote thus:—

> The cuckoo from the wood I hear;
> He has no thought to fill my ear;
> And yet the sounds come sweet to me—
> The note of bird in ecstasy.
>
> Continuous, full, it floats and fills
> The air with soft impassioned thrills,
> And makes me think of days gone by,
> When I had gracious company.

Goethe was much exercised by the knowledge of the cuckoo's habits in certain respects. We find Eckermann and him thus speaking as reported in the "Conversations":—

"We know," said I, "that it does not brood itself, but lays its egg in the nest of some other bird. . . . . We also know that these are all insect-eating birds; and must be so, because the cuckoo itself is an insect-eating bird, and its young cannot be brought up by

a seed-eating bird. But how does the cuckoo find out that these are all actually insect-eating birds? For all differ extremely from each other, both in form and colour, and also in their song, and their call-note. Further, how comes it that the cuckoo can trust its egg and its tender young to nests which are so different with respect to structure, dryness, and moisture? The nest of the wren is so dry and close, that one would fancy the big young cuckoo would be suffocated in it, yet it thrives there; it thrives, too, in the nest of the yellow wagtail, which builds upon damp commons in a nest of rushes."

Eckermann was wrong about the cuckoo invariably choosing the nests of insect-eating birds for its eggs—it sometimes has recourse to nests of seed-eaters; but the young cuckoos adapt themselves, and flourish just as well.

But in truth, the very word "insect-eating," as implying a hard and fast distinction from which there is no variation worth noting, is egregiously misleading. Not a few birds which pass amongst the crowd as seed-eaters, such, say, as the Greenfinch, notoriously, in the time of feeding the young, resort largely to insects and caterpillars; and I am even inclined to think from facts which have come before me, and which I have myself observed, that all birds more or less in the time of feeding the young will largely and most astonishingly vary and extend the list of edibles. Canaries, more especially at that time, will devour plant-lice and sometimes even try ants-eggs, which I would not have credited had I not seen it; for, having once had a nightingale and what is wrongly called a "grass-finch," I first got proof of this by chance,

owing wholly to the conditions in which I kept my canaries and finches—free at certain times to fly about the room, in one end of which I had my aviary.

This tendency of seed-eating birds to vary from seed-eating, more especially at the time of feeding young ones, would thus be all in favour of the young cuckoos. If they rejected the seed diet, they would come in for relief through the insects, for which the foster parents would now be on the look-out; and a question may well here arise whether these facts may not have had their own influence in turning certain seed-eaters more and more definitely into insect-eaters during the period of feeding the young.

On the other hand, there are several birds, among them the Blackcap and the Garden-warbler, which, though set down in bird-books as insect-eaters, are largely seed and berry-eaters too, and there can be no doubt that blackcaps often remain in this country all the winter, managing to "make a do of it," as London working women say, by aid of elderberries, mountain-ash berries, and other berries.

The crossbills are put down in some ornithological handbooks as feeding entirely on fir seeds, but they feed freely on aphides, small flies, and minute beetles, and this more especially at the period of rearing the young.*

Even linnets will turn insect-eaters at breeding and other times. We read:

"In 1891 there was a plague of black diamond moth caterpillars. Rooks, plovers, seagulls, starlings, *linnets*, *greenfinches*, and yellowhammers all turned to police duty and ate the grubs. Only the sparrows

* *Zoologist*, 1895, p. 228.

held aloof, and among returns from all counties, from Dover to Aberdeen, only three spoke in praise of the sparrow.*

And this, though the Linnet by systematic ornithologists is set down as the most persistent seed-eater of all the finches. Mr. Howard Saunders says that "the Linnet's food consists of soft seeds, especially those of an oily nature, such as the various species of flax and hemp; grains of charlock, knot-grass, and other weeds, are also largely consumed, while in winter various kinds of berries and even oats are devoured." Dr. Bowdler Sharpe affirms that "the Linnet is not known to feed its young on insects to the same extent as most of the other finches." †

When bringing up the young, the linnet in some cases, at all events, has recourse very largely to small insects.

The self-same process is working itself out in America as in Great Britain. We might multiply extracts here to prove it, but these will come with more effect, falling in at their proper places. Here, however, are the words of one of the most recent authorities:

"When we had forests and woodlands edged with belts of shrubbery, swamps with masses of thickets, when on the roadsides and along the fences trees and bushes overgrown with vines and other climbing plants grew in abundance, we had birds everywhere and in plenty. They limited the increase of insects, but now that the birds are gone, insects have no enemies and can increase to unlimited numbers. All

* *Spectator*, May 13, 1899.

† Handbook, p. 45.

small birds are insect-eaters, and at certain seasons of the year they feed on nothing else." *

If it should be found that there is anything in the suggestion above, it presents quite a new phase of adaptation due to special circumstances.

Mr. Westley T. Page, F.Z.S., whose experience is very large, writes generally thus:—"Though waxbills and finches will do well for a long time on seed alone, they are the better in condition, and more brilliant in plumage for the soft food and an occasional insect." †

Waterton indeed seriously raises the question whether severity of climate and the food question have anything to do with migration, since he finds that, like most of the migrants, the wren, the hedge-sparrow and the robin are insectivorous birds, and yet can manage not only to subsist through the English winter but to increase their numbers.

Of all birds the stomach and digestive organs of the cuckoo would seem to render it most unsuited for seed-eating; yet we are quite aware that White, of Selborne, in his dissections, found among worms, flies and caterpillars, many seeds in the stomach of the cuckoo—seeds which, on our theory, would be taken so far medicinally, perhaps, more than aught else, as dogs and many carnivorous creatures eat grass, etc., with *this* view. But the wonderful adaptations of nature in providing exceptional cases to all rules is what to us forms the special attraction of natural history study and observation.

Let us end this section as we almost began it, by

* *H. Nehrling*, i, p. xxviii.

† *The Feathered World*, 14th July, 1899, p. 42.

quoting from Goethe's "Conversations with Eckermann," in continuation of what was said above:

"This is a mystery," returned Goethe. "But tell me how the cuckoo places its egg in the nest of the wren with so small an opening."

"The cuckoo lays it upon a dry spot," returned I, "and takes it to the nest in her beak. I believe, too, that she does this with the wren's nest and with all others. . . . Supposing that she lays five eggs, and that all these are properly hatched and brought up by affectionate foster-parents, we must still wonder that Nature can resolve to sacrifice at least fifty of the young of our best singing-birds for five young cuckoos."

"In such things, as well as in others," returned Goethe, "Nature does not appear to be very scrupulous. She has a good fund of life to lavish, and she does so now and then without much hesitation. But how does it happen that so many young singing-birds are lost for a single young cuckoo?"

"The first brood," I replied, "is generally lost; for even if it should happen that the eggs of the singing-bird are hatched at the same time with that of the cuckoo, which is very probable, the parents are so much delighted with the larger bird that they think of and feed that alone, whilst their own young are neglected and vanish from the nest. It is a long time before it attains its full size and plumage, and even after it has flown it requires to be fed; so that the whole summer passes away and the foster-parents do not think of a second brood."

"This is very convincing—very remarkable," said Goethe.

But even Eckermann did not know some of the blackest facts about the cuckoo and its ways. Every new fact discovered, indeed, seems only to make him blacker. He not only drops his eggs in other birds' nests, but his young are specially armed with powers to throw out of the nest the true children of the birds under whose protection they have been placed, so that they may have no competitors in demanding food from the foster-parents, who devote themselves in a truly wonderful manner to feeding and nurturing these intruders and aliens.

II.

Difficulties, however, begin at the very start in the study of this strange bird-monster—our common cuckoo, scientifically, *Cuculus canorus*. For a long time it was thought that when it had fixed upon the nest it meant to drop its egg in, it watched a favourable opportunity and sat upon the nest till it had deposited its burden. But it has been found that the cuckoo drops its eggs into nests so small and so formed that it is impossible the bird could have sat upon the nest. Its egg has even been found in domed nests. It chooses various nests, from those of the Meadow-pipit, Hedge-sparrow, and Wagtail, up to those of the Red-backed Shrike, the Bunting, taking no end of nests between, including those of the Reed-wren, the Redstart, the Icterine Warbler, and sometimes even using those, though that must be exceptional, of the House-sparrow, Jay, Thrush, and Wood-pigeon. Almost every bird whose nest is the least suitable is victimised.

Lord Lilford says: "I once and only once met with a cuckoo's egg in a spotted fly-catcher's nest." *

These facts have forced naturalists to conclude that the cuckoo does not *lay* the egg in the nest at all, but lays it on the ground and carries it in its beak, and so deposits it in the nest chosen for it. This has now been observed and verified by so many naturalists that it cannot be doubted; and this fact disposes of the fine theory of some distinguished speculators that the zygodactyle feet—that is, feet with two toes behind and two toes in front, as in the case of parrot and wood-pecker—admirably enabled it to lift and carry its eggs in its claws. The reason for the zygodactyle feet must therefore be sought elsewhere.

Looking at Mrs. Blackburn's drawing, it has suggested itself to me that here we may have a reason for the zygodactyle feet. A bird with but one smaller shorter toe behind clearly could scarcely so fix its feet beneath as to retain position leaning against the side of the nest with its posteriors: it would slip away. But with the two hind toes with claws well fixed the thing would I think be possible. In the case of the wood-peckers, which for the same reason need to fix themselves in trees, the two hind toes would do much to keep the bird from slipping down through the front toes giving way. There is no such reason I have ever heard of for such a formation in the habits of the cuckoo; and any hint to account for their presence may be suggestive, and lead others to bring their minds to bear upon it. Any way, I have as yet heard of no other necessity in the life-economy of the bird or adequate explanation of it; and I shall be

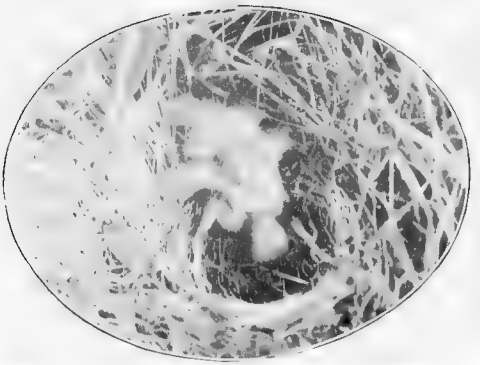
* *Birds of Northamptonshire*, i, p. 79.

glad to hear what other ornithologists, anatomists, and biologists have to say on that particular point. The zygodactyle feet are very fully developed even in the egg.

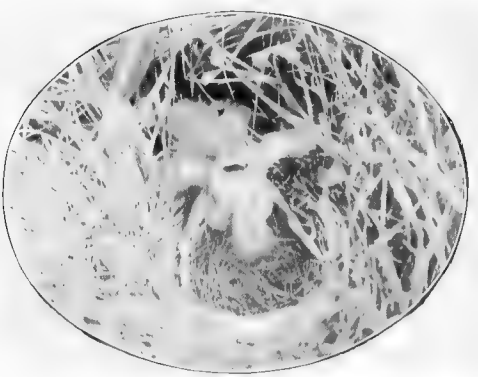
I discount the idea of one writer in ornithology that this form of foot is favourable for letting the cuckoo stoop freely to the ground in certain positions to pick insects off low-lying leaves; because nature has already advertised that another form of foot is at least equally adapted to business of that kind, and with it has supplied many birds which stoop low, and run, hiding among grass and vegetation—notably, the Corncrake and the Nightjar, which certainly does stoop and run, and fly wondrously fleet, as well as others.

The writer of the article "Cuckoo" in the *Encyclopædia Britannica*, Professor Alfred Newton, to wit, who is exceedingly cautious, and who wrote before some of the most valuable and best authenticated facts about the bird were published, is compelled to accept this as proved, citing these two cases:—

"The most satisfactory evidence on the point is that of Herr Adolf Müller, a forester of Gladenbach, in Darmstadt, who says (*Zoolog. Garten*, 1866, pp. 374-375) that through a telescope he watched a cuckoo as she laid her egg on a bank, and then conveyed the egg in her bill to a wagtail's nest. Herr Braune, a forester at Griez, in the Principality of Reuss, shot a hen cuckoo as she was leaving the nest of an icterine warbler. In the oviduct of this cuckoo he found an egg coloured very like that of the warbler; and on looking into the nest he found there an exactly similar egg, which there can be no reasonable doubt



CUCKOO EJECTING YOUNG BIRD FROM NEST (1).



CUCKOO EJECTING YOUNG BIRD FROM NEST (2).

had just been laid there by the cuckoo. Moreover, Herr Grunack (*Journal für Orn.*, 1873, p. 454) has since found one of the most abnormally-coloured specimens, quite unlike the ordinary egg of the cuckoo, to contain an embryo so fully formed as to show the characteristic zygodactylic feet of the bird, thus proving unquestionably its parentage."

The fact that the young cuckoo mercilessly ejects from the nest and makes an end of his foster-brothers is now just as well established as that the parent drops the eggs into other birds' nests. Soon after being hatched, the young cuckoo exhibits great restlessness, irritability, and energy. Whatever is in the nest it endeavours to get under. It keeps on beating its stumps of wings, and as it gets older will spar with its wings and peck at the finger, if placed near it. The other nestlings are usually disposed of by it during the second or third day, and any eggs share the same fate as the young birds. It will permit nothing in the nest beside it—whatever is dropped in, it will lift up and throw over the edge. Difficulties have been raised about the possibility of the young cuckoo throwing the other nestlings out of domed nests; but these are much reduced, if not met, by the fact that in open nests, set in certain positions, the area on the edge of the nests which the young cuckoo could make available is but one-fifth of the whole circumference, and that it has a special instinct for working always toward the open portion; besides all which the birds in the domed nests it favours would generally be very small birds. Later observations prove that in addition to great strength of shoulder and wing stump, the young cuckoo is aided by a

curious depression in the back behind the shoulders, which disappears as the bird grows older. Its back, in fact, forms nothing short of a kind of shovel, with which to lift handily whatever it succeeds in once getting under. Mr. J. H. Gurney well points out that its stumps of wings are like arms with ill-formed hands, which they really are. All this has of late years been repeatedly observed, and this not by solitary observers, but by whole parties.

Mrs. Blackburn (the well-known bird observer and artist) and her friends, had peculiarly favourable opportunities of observing the process by which the young cuckoo threw the true birds out of the nest. A cuckoo had intruded an egg into the nest of a meadow-pipit which was at the foot of a low shrub on a gentle slope of turf. The nest so rested on the turf amid shrubs that only one side of the nest was really open for anything to be ejected. Mrs. Blackburn's attention was first called to the circumstance by seeing young birds struggling on the sloping turf. Thinking that they had been thrown out of the nest by some accident, she went, took them up, and put them back in the nest. They were speedily thrown out again. At last she contrived a means by which she could see into the nest. The young cuckoo edged about in the nest until he got his shoulder and wing under the poor nestling, then edged up and up, standing upon his sprawling long legs, his feet fixed in the sides of the nest material until he was high enough, then he elevated the shoulder furthest from the edge of the nest, making, with the most wondrous, unerring precision, always to the open side of the nest, and then

with a hitch threw the poor thing out. Further observations made by this lady went anew to prove that the growth of the upper bone of the wing in the young cuckoo is exceptionally quick, and that this part is exceptionally strong—simply, as it would seem, to arm it with full resource for this instinct of deadly self-preservation which it possesses. Mr. J. E. Harting in *Our Summer Migrants* reproduced Mrs. Blackburn's drawing of the young cuckoo throwing out the pipits.

Mrs. Blackburn adds that the young cuckoo was "perfectly naked, without the vestige of a feather, or even a hint of future feathers; its eyes were not

yet opened, and its neck seemed too weak to support the weight of its head. . . . The most singular thing of all was the direct purpose with which the blind little monster made for the open side of the nest, the only part where it could throw its burden down the bank. I think all the spectators felt the sort of horror and awe at the apparent inadequacy of the creature's intelligence to its acts that one might have felt at seeing a toothless hag raise a ghost by an incantation. It was horribly uncanny and gruesome!"

Dr. Charles Creighton, in his *Vaccination and Jenner* and elsewhere, has dealt with statements about the cuckoo's habits, and the peculiar points of structure in the young cuckoo, in a spirit of thorough scepticism to say the least. Here is one passage:

"The young cuckoo's back, it seems, is especially designed for the lodgment and ejectment of eggs and young birds, for, different from other newly-hatched birds, its back from the scapula downwards is very broad, with a considerable depression in the middle. This depression seems formed by nature for the design of giving a more secure lodgment to the egg of the hedge-sparrow or its young one when the young cuckoo is employed in removing either of them from the nest. When it is about twelve days old, this cavity is quite filled up and then the back assumes the shape of nesting birds in general. This unique and marvellous structural change, it need hardly be said, has no existence; nor did Jenner seek to establish this assertion in the only way in which it could be established, by a series of dissections. Moreover, he himself inadvertently supplies the key to the illu-

sion and the fanciful anatomy by his remark on the previous page of his wondrous tale of ejectment, that the young cuckoo 'makes a lodgment for the burden by elevating its elbows.'" *

Now, did Dr. Charles Creighton himself make the series of dissections here desiderated, and is he, on the ground of that, ready to say that Montagu, Yarrell and Bishop Stanley, Mrs. Blackburn and her circle, Mr. John Hancock and his friends, and Mr. R. Kearton, are not only unworthy of credence for solemnly-given evidence, some of which will be immediately presented, but that, in short, they are all conscious and determined liars? An answer will oblige.

Other instances of wonderful structural adaptation in young birds, certainly not more essential to their preservation than is this in the young cuckoo, on the theory of its often itself getting rid of the legitimate birds, are to be found in many cases, and some of them shall be cited at once.

The late Mr. John Hancock, a well-known Northumbrian ornithologist, reported observations almost entirely to the same effect as those of Mrs. Blackburn. In this case the nest was that of an *accentor* or hedge-sparrow.

He wrote:—"It is quite certain that the young are ejected very soon after they are hatched; of this I have conclusive proof. On the 6th June, 1864, I observed a nest of the Hedge-Accentor, which con-

* Mr. Howard Saunders says that this cavity on *its back fills up after the* twelfth day. *Manual of Birds*, p. 278. Does Mr. Saunders here speak from observation and experience and dissection, or does he merely repeat the dogma of Jenner?

tained five eggs, four belonging to this bird and one to the cuckoo. I visited the nest again on the 8th June, and found three young hedge-accentors and the cuckoo hatched, one of the hedge-accentor's eggs having disappeared; the three young hedge-accentors lay on one side of the nest, the cuckoo on the other by itself. On the morning of the following day I once more went to the nest; the three accentors were gone, and the cuckoo was the sole occupant. One of the accentors lay dead on the ground below the nest. On the 10th June I saw the foster parents feeding the cuckoo.

"When the egg of the cuckoo is not hatched, the young of the foster birds are reared. In 1870, I met with a case in point; the nest contained two eggs of the hedge-accentor and one of the cuckoo; after a day or two the accentors were hatched. I continued to watch for several days, in the hope that the cuckoo's egg would be hatched, but it proved to be addled. The parents fed their little brood with great attention and neither they nor the young took any notice of the unhatched egg, which lay sometimes above, and sometimes below the nestlings."*

Fourteen years later Mr. Hancock described observations corresponding exactly to those of Mrs. Blackburn.

He tells that he had often tried to find opportunities of observing this marvellous performance.

"I began in June, 1884, at Oatlands, Surrey," he writes, "to search the grounds carefully for as many nests as I could find that were likely to have cuckoos' eggs in them, and was fortunate enough to discover

* *Catalogue of the Birds of Northumberland*, pp. 26, 27.

one in a spot convenient for making continued observations on the 17th of June. The cuckoo's egg was in the nest of a hedge-accentor, containing four of its own eggs, and built in a bramble-bush near the bottom of the sloping terrace at Oatlands. I tried the cuckoo's egg and one of the hedge-accentor's in water to ascertain if they were fresh or setting. The former floated, denoting that it was setting; the latter sinking to the botton was, of course, fresh.

"On the 25th of June I examined the nest. No change had taken place. There were still the one cuckoo's egg in the nest and the four accentors.

"On Friday, the 27th June, I looked at the nest at three o'clock in the afternoon and the cuckoo's egg was hatched and one of the accentors. At twenty-five minutes to six o'clock I looked at the nest again, and another accentor's egg was hatched.

"On Saturday morning, 28th June, I rose early and went to the nest at twenty minutes to four o'clock a.m. All was quiet and the old bird on the nest. At two minutes past five o'clock I saw into the nest. There were just as before the young cuckoo, the two young accentors, and the two eggs. A few minutes after five o'clock the young cuckoo attempted to put an egg out of the nest by getting it on its back in the most clumsy manner, but it did not succeed in getting the egg high enough to roll it over the edge of the nest. Immediately after this proceeding the old hedge-accentor came on to the edge of the nest and stooped down with its head into the nest and took some white matter into its mouth (I think excrement from the young birds) and swallowed it. [No doubt whatever it was this; for my canaries and

other caged birds made it a strict point of duty after feeding the young in the earlier stages to wait and see if they needed to do such service as this, and a wonderful accommodation to necessity it is.]

"The old bird went on to the nest and off again four or five times in about two hours. I left for breakfast at eight o'clock, the old bird sitting on the nest. Returned at half-past eight. The old bird was off the nest, and the young and eggs as before lying quiet at the bottom of the nest. . . . (She was off for about ten minutes now, and then again afterwards). When off this last time an accentor's egg was put on to the edge of the nest by the young cuckoo in my presence. This was at half-past ten. The egg rested on the edge of the nest for some time, and then it fell down into the bush by the movements of the old bird on the edge of the nest. The cuckoo then fell to the bottom of the nest, apparently in a very agitated state and overpowered or exhausted by the effort. The mother then returned, . . . but remained a very short time on the nest and seemed very uneasy, raising herself and standing in the nest. The cuckoo seemed to be increasing in bulk and was much agitated, lying at the bottom of the nest. The two young accentors lay motionless at the bottom of the nest, whilst the cuckoo kept moving its wings like hands as if to excite or stir its companions into action. In about twenty minutes the cuckoo made two desperate attempts to get one of the young accentors flung over the edge of the nest, but failed, for when it got the young one to the top it fell back again into the bottom of the nest. Another unsuccessful struggle took place when the mother was on the side of the

nest. About eleven o'clock the first young accentor was put over the edge of the nest exactly as illustrated by Mrs. Blackburn. The mother was present, but took no notice of the affair going on, but looked on calmly. The second egg was pushed out at one p.m., in the presence of myself, Miss Abbs, and my sister, whom I had specially invited to come and see the proceedings of the young cuckoo. The last and fourth of the lot we left in the hands of the destroyer. It was sitting almost on the back of the cuckoo, which had had one try to put it over the edge of the nest, but had failed. At half-past three when we returned to examine the nest, the young cuckoo was the sole occupant.

"The first baby accentor which had been thrown on to the edge of the nest was still alive, so we put it into a white-throat's nest, which had four young ones about a day old, and from all appearances it will be properly attended to by its foster-parents.

"The cuckoo's proceeding, as I saw it, is in my opinion the most wonderful and unaccountable piece of business that I ever witnessed in bird-life. . . .

"These observations, though they may seem to be a repetition of the accounts given by Dr. Jenner, Montagu, Mrs. Blackburn, and other accurate observers, are nevertheless necessary in these days; for, in the minds of some ornithologists, it seems to be still an undecided question—how the young cuckoo gets the young of its foster-parents from the nest! I have before had an opportunity of ascertaining the fact, and expressing my full belief in the accounts given by Dr. Jenner, Col. Montagu and others, as stated in my catalogue, (p. 26), but till last summer I

had not had a successful opportunity of watching the whole process as carefully as I was able to do on that occasion.

"Since these observations were made, my attention has been called to the following quotation from Mr. Henry Seebohm's *History of British Birds*, (vol. ii, p. 383): -'It has been said, on what appears to be incontestable evidence, that the young cuckoo, soon after it is hatched, ejects the young or eggs from the nest by hoisting them on its back; *but one feels inclined to class these narratives with the equally well authenticated stories of ghosts and other apparitions which abound!*'

"The facts observed with much care and minutely related in this note support the 'incontestable evidence' given by Dr. Jenner, Montagu, and Mrs. Blackburn, so fully and conclusively, that I am at a loss to understand how anyone who has not personally investigated the matter thoroughly for himself could allow himself to express so strong an opinion as Mr. Seebohm has done in the italicised portion of the above quotation." *

The Rev. Alfred C. Smith mentions in *Zoologist* for 1873, (p. 3474), "that Mr. Briggs had himself (though I had overlooked the circumstance) seen with his own eyes the attempted expulsion of a young pipit from its nest by an infant cuckoo." (*Zool.*, ss. 914.)

Mr. Oswin A. J. Lee, who has made very careful observations on cuckoos and the behaviour of their young, says:

* Transactions of the *Northumberland and Durham Natural History Society*, vol. viii, pp. 210, 217. 1886.

"In only one case have I heard of a young cuckoo failing to destroy the whole brood. This was a young robin which took up its position among the ivy rootlets beside the nest, from which the cuckoo could not eject it. Both birds eventually flew."

Mr. Kearton has the remark: "The young cuckoo turns out all the other members of the nest in which it is hatched, an operation to which I was witness on one occasion." *

In 1837 J. Gould wrote thus in the *Birds of Europe:*

"Shortly after the young cuckoo is excluded from the shell, it attains so much strength as to be able to eject the true young from the nest, itself remaining the sole occupant; and, in fact, from its large size and ravenous appetite it is as much as these substituted parents can do to supply it with food." That is good; but in his *Birds of Britain* (1873) he gives a beautiful drawing of the young birds thrown out by a young cuckoo, yet writes thus: "May we not more readily believe that the young have been thrown out by the foster-parents, who, having bestowed all their attention on the parasite, thus cause the death of their own young, which are then cleared out of the nest in the same way as broken eggshells, fæces, and other extraneous matters are. . . . I do not believe that on the third day the young cuckoo has the power to throw out all the occupants of the nest." Mr. Gould's *volte face* is funny; he harks back on an old idea at the very time when the actual process of turning out had been observed and recorded.

This pious wish or hope expressed above for the

* *British Birds' Nests*, p. 42.

cuckoo, is, however, completely dissipated by well verified facts and observations, some of which we shall, in a moment, present; young birds found lying —having been turned out of the nests either by the young cuckoo or some other bird—are in most cases perfectly well nourished and with their crops full, as we ourselves have more than once found them. —hedge-sparrows, meadow-pipits, and wagtails, etc. An observed fact or series of facts on our own part which also meets the proposition that the true young are first starved, and then over-laid by the quick-growing young cuckoo, as Pennant fancied.

This matter just shows how little reliance is to be placed upon so-called experts often, very often, when they go beyond their proper office of observing, and faithfully recording their observations. John Gould was, like many others, a splendid practical field ornithologist, or classifier, but he was no thinker, and was mostly either very weak or very far wrong when he attempted anything outside his proper province. I question whether a pair of small birds would be able to turn out a young bird in the way he supposes—at all events, in some circumstances and from some nests—in fact, the power of the young cuckoo to do so is in itself more likely by far from its quick growth than the other.

We are told by a more recent writer that Mr. Gould remained sceptical about the young cuckoos ejecting the true young from the nest, and was converted by the evidence of Mrs. Blackburn and Mr. Hancock; and in the introduction to his first work published afterwards he frankly admitted it, though Mr. J. E. Harting could not miss the chance in *Our*

Summer Migrants, of reminding him that the same observations had already been recorded by Jenner, Montagu, Blackwall, Durham Weir, and Adolf Müller. But Mr. Gould's, from the extracts above, was a re-conversion. In 1837, he, like yet bigger men, implicitly followed Jenner; in 1873 alongside a drawing of the young cuckoo in the act of ejecting the true young, he actually set down a caveat against this charge and explained the facts differently, and then, later, was reconverted to his opinion of 1837. His case here was an exact illustration of Tennyson's words:—

> "It is not true that second thoughts are best,
> But first and third, which are a riper first."

The necessity for complete success in extermination of foster-birds' progeny on the cuckoo's plan may be found in this that when any of the true young are left, the proper instinct of the foster-parents will more or less assert itself. This has confirmation in the following anecdote from Dr. A. E. Brehm, told through the Rev. A. C. Smith:

"In June, 1812, says my father, a wren's nest was found on the manor of Frohlichen-wiederkunft, which contained two young wrens and a cuckoo—quite an exceptional case; the dome of the nest had preserved the young wrens from being ejected by the cuckoo. A friend of mine took the cuckoo when it was almost ready to fly and, as is often done by bird fanciers, placed it in a cage, intending to bring it to me as soon as it was fledged. The foster-parents in this case, however, abandoned the foundling, and in two days it was found starved to death; the wrens,

having taken up their abode elsewhere with their own nestlings, had not been able to feed both their own young and the cuckoo." *

I am perfectly familiar with the paragraph on the Cuckoo, which Mr. Waterton threw, rather inconsistently, into his essay on the Jay (*Natural History Essays*, 1st series), and in which he ridiculed the idea of the young cuckoo having any such power. His remarks about the old bird always remaining on the nest during the whole of the day on which the chick is excluded from the shell, in order to protect it, wants qualification; there are, as we shall specially see, reasons why she must sometimes leave the nest on that day, and even when cleaning and drying the young bird she must be on the edge of the nest, not sitting on it strictly. But even though we admitted that Mr. Waterton was correct here as regards normal cases, it certainly is not true when a young cuckoo has been hatched; for somehow or other he has the power not to let her do so, as comes out well in Mr. J. Hancock's observations, and is amply confirmed by my own; and this, on the very first day to a certain degree, and yet more on the second or third day, when generally he wishes to begin more definite operations. I am quite familiar, too, with the bit in the essay on "the Wren, the Hedgesparrow, and the Robin" (second series), which is nothing more nor less than a rough condensed repetition of what he had said as above.

Mr. Waterton was so good an observer and so true a lover of the birds that I should indeed be sorry were I forced to expose some of his errors and shortcomings

* *Zoologist*, May, 1873.

about birds and other creatures, which usually arose from his accepting some preconceived idea, and trying to make all facts bend to it; and one of these is a certain dogmatic statement in one place about the cayman.

And Waterton, too, was very fond of a practical joke, as his "manlike monster" clearly proves, still misleading good men and true.

Mr. Waterton's deliverance, cited by Dr. Charles Creighton, as authoritative and final, was made to bear far more weight than it was in any way entitled to. Dr. Creighton, in a burst of triumphant scepticism, in effect, cries out: "If this takes place why are we not presented with photographs of it?—that is the one way to convince us. As for artists like Mrs. Blackburn, they can draw what they please—all out of their own brains: we can't trust them, or such as them." Well, just as this book was being put into type, comes the *Feathered World*, of 14th July, 1899, with two photos of young cuckoos throwing out young birds, due to the patience, care and well-directed enthusiasm of Mr. John Craig—whom all the world will thank for so far decisively setting this matter at rest. It is not so easy to do a thing of this sort—a nest must be chosen, carefully watched, and the psychologic moment seized without any faltering—everything ready and nothing wanting. Mr. J. P. Miller's photographs are decisive enough for the most sceptical, and anew demonstrate that to carry a prejudice against vaccination and its founder to the point of rejecting reasonable evidence on a question of Natural History is at all events not a very scientific or philosophical procedure.

"We proceeded to the nest," says Mr. Craig, "and placed the young yellow-hammer I had found and taken with me in it, beside the young cuckoo. After a few minutes delay, the cuckoo hoisted the yellow-hammer on its back and climbed up the side of the nest backwards and shot the bird over the nest. We put the bird into the nest again when the cuckoo repeated the operation. Six snapshots were taken" (two of which, by the great kindness of Mrs. Comyns-Lewer, and Mr. Craig and Mr. J. Peat Millar we are enabled to give) "with the young cuckoo on the top of the nest ejecting a yellow-hammer from a meadow-pipit's nest, one of them was taken with the yellow-hammer lying outside the nest, the other three were taken in different stages in the nest. So far as I am aware, these are the first snap-shots that have been taken of a young cuckoo ejecting a young bird from the nest. The cuckoo was about five days old, and the yellow-hammer about three or four at the time that the snap-shots were taken.

"On June 15, 1899, I saw another pipit's nest, containing a cuckoo's egg and four pipits' eggs. I broke one of the latter's eggs, but the egg had only been sat upon a day or two. I again visited the nest on June 14th, but none of the eggs were hatched. I again visited the nest the following day, when the cuckoo had hatched, and one of the nest-owner's eggs was lying outside the nest. I put the egg back into the nest again. The cuckoo was not twenty-four hours old. I again visited the nest on the following day along with Mr. J. Peat Millar, when we found the cuckoo the sole occupant, and the three pipits' eggs lying outside the nest. We placed one of the eggs in

the nest, when the cuckoo immediately commenced to hoist the egg on its back and began to climb, and when near the top of the nest a snap-shot was taken, but, owing to a small tin having slipped, Mr. Millar had to expose the plate, which was spoiled in trying to take another snapshot. The bird then became extremely restless, and though somewhat exhausted, it made several attempts to reach the top of the nest with its burden, but failed.

"I again visited the nest on the following day, and put an egg into it, but the bird was not inclined to begin operations. I dropped another egg into the nest, when it immediately began to hoist one of them on its back, and carried it to the edge of the nest and threw it out. But there was no snap-shot taken as Mr. Millar had to attend to his business at home, Saturday being a busy day with him. We again visited the nest on June 19th, but the bird would on no account commence operations, though we put four eggs into the nest, showing nothing of the restlessness that it had done three days before.

"I have spared no effort to prove my case and make a clean sweep of my opponents."

Mr. Craig's observation of the nest with two young cuckoos in it is in favour of the stronger young cuckoo throwing the weaker one out. "It was about four miles from where I reside, and the other one about three miles; so that every time I visited the nest of the former I had to walk eight miles; and of the latter about six miles, which amounted to more than one hundred miles, which was no child's play on these warm summer evenings in June."

Mr. Craig's observations go to support the idea that the cuckoo will not begin operations after five days old. Mr. Craig tested this in various ways, putting different young birds into the cuckoo's nest before the cuckoo's fifth day, and these were invariably thrown out; but, after the fifth day, the cuckoo loses the desire to operate on what is put beside it, as was proved by the fact that a cuckoo of about ten days allowed a hedgesparrow of about eight days to lie quietly beside it.

The editress of the *Feathered World* makes this note on Mr. Craig's article and snapshots:

"When the outline of the young cuckoo in the two pictures is once grasped one can see how well suited for its fell purpose is the position it takes up. Head well down, legs wide apart gripping either side of the nest, wings outstretched to prevent any slipping back sideways, the unfortunate victim well poised on its broad back, the curious depression in which serves to steady it—the attitude is perfect for accomplishing the final act in the curious tragedy of nature by which a cuckoo is reared at the expense of the family of its foster-parents. My only regret is that want of time did not admit of my suggesting to Messrs. Craig and Millar an enlargement of these sharp little negatives, which, when seen under a magnifying glass, reveal to an even greater extent the murderous method of the nestling cuckoo, so well described by Mr. Craig in his interesting article."

There are various and conflicting theories about the cuckoo's power in adapting its eggs to the nests in which it drops them and also regarding the process followed, but it is undoubted that cuckoos' eggs vary

through a wider range of colour than those of any other bird.

As to size, the eggs are on an average only one-fourth of that expected from the size of the bird, though in weight, as the careful tests of Mr. Bidwell as well as my own undoubtedly show, the eggs are much heavier than any eggs of the same size. Dr. Rey, too, dwells on the weight of shell of egg of *Cuculus canorus*.

This fact would be remarkable enough even did it not bear on remarkable facts beyond it. The habits of the foster-birds as to nests vary so vastly that it is hardly credible the young of one species could thrive in all—in open nests, in domed nests, nests hung over water or moist places as with the Reed-wren and Sedge-warbler, nests high in trees, nests low in shrubs or even on the ground like those of the nightingales and larks.

A list of 120 species in which cuckoos' eggs have been found is published by Mr. Bidwell in the *Bulletin of the British Ornithologists' Club* for March, 1896. But adaptation and resource are everywhere conspicuous. The cuckoo, when he cannot find his favourite nests, makes others, and apparently unpromising ones, suit him equally well.*

* The most notable in regard to numbers of eggs from nests of each species, in his collection of over 900, being:—1, Hedge-sparrow, 74; 2, Redbreasts, 65; 3, Reed-warblers, 62; 4, Meadow-pipits, 49; 5, Garden-warblers, 47; 6, Sedge-warblers, 41; 7, White-Throat, 38; 8, Pied Wagtail, 34; 9, Blackcap, 33; 10, Tree-pipit, 33; 11, White Wagtail, 32; 12, Red-backed Shrike, 25; 13, Yellow Bunting, 23. N.B.—Mr. Bidwell tells me that among the 74 from Accentors' nests was a blue egg, taken by Mr. Robert H. Read, a well-known and reliable ornithologist.

Mr. Cecil Smith writes about Guernsey: "Tree and meadow-pipits, skylarks and stonechats, from their numbers and the numbers of their nests, must be the foster-parents most usually selected in the Vale of Guernsey; other favourites, such as wag-tails, hedge-sparrows, and robins, being comparatively scarce in that part of the island. *

The Vale of Guernsey is singular in its lack of trees—it is devoted to gardening and culture of the vine;—flat and over considerable spaces gorse-clad, it was at one time under water.

As one other indication of the wide range and adaptability of the cuckoo we may note that Mr. Robert Collett in his *Bird Life in Arctic Norway* puts *Cuculus canorus* among the breeding species of Arctic Norway.

Mr. Popham found *Cuculus canorus* on the Yenisei. It arrived on May 22 and soon became common; and there its cry is "Hoo, hoo," a sound which Seebohm attributed to the Himalayan Cuckoo. "The forest round Yeniseisk is full of cuckoos, but we soon left them behind us." †

III.

THE rule laid down for birds generally with regard to helplessness after hatching is not without very marked exceptions, even in cases where the young are not, as in the case of partridges, water-hens, coots, etc., able to move legs and run freely, and have what is strictly no period of helplessness proper after

* *Birds of Guernsey*, p. 98.

† *Ibis*, October, 1898.

emerging from the egg. The little Grebe or dabchick is a most peculiar instance. It can when only a few hours old, with the help of the parent, dive and float and swim a little, but it cannot walk—cannot indeed in the least walk for some seven days; yet it can move about pretty actively by help of legs and wings, which, by-the-by, is itself a wonderful adaptation by modification in view of remarkable exposure to enemies.

Professor Alfred Newton in *Zoologist*, 1889 (p. 577), told this about a newly-hatched little Grebe (*Podicipes fluviatilis*), that is, dabchick, not more than twelve hours old, which had been brought to him, that "when laid on a table covered with a cloth, it not only crawled about it, but crossed it completely from side to side without indeed actually sustaining its weight by its wings, but dragging itself forward by their means quite as much as it impelled itself by its legs. The resemblance of its actions to those of a slowly-moving reptile was very remarkable."

Here, too, we find the young ones from the very nest armed with special powers for their protection in wholly special ways, the wings of the adult dabchick being so formed that the young must be able to cling to them so, in fact have some special means of so holding on in running, diving, and swimming that they are without risk of falling off, since there is no record I can find of their having been dropped when in the course of being so carried; and this would be incomprehensible unless, as in one or two other cases, some express provision had been made in view of the necessity. Indeed, when you think of it in a creature no more than a few hours old, it is almost as wonder-

ful as the powers of the young cuckoo in turning eggs and foster-brothers out of the nest when a few days old. And this is all the more extraordinary in that a very careful observer has told us that in swimming "old and young dabchicks use their legs like a frog, horizontally, striking both at once, and bringing their feet together at the end of the stroke. I have seen the old ones diving" [and swimming?] "in clear water some distance, but they did not use their wings." *

This is the more curious and suggestive, surely, that Professor A. Newton, as quoted above, is clear that on a flat surface the wings are at least as much called on in locomotion as the legs are, if indeed they are not more efficient than the legs in aiding the young dabchick here. But in these matters, where observation of the creature in wild nature can be but in hurried broken glimpses, much must always be doubtful. The point here is that since the wings are not used in swimming but the feet, the feet and legs should not have been more developed and the wings less developed at this stage in view of what, according to all the reasoning we can base on observed facts, it would earliest want to use both on land and in the water for its protection and escape from enemies.

Then there is that truly unique bird—the Hoatzin—a native of South America and the West Indies, which is endowed with a peculiar power of moving about almost from the first. A curved or hooked nail is developed even in the egg on the finger points of

* Mr. Bryan Hook in Seebohm's *British Birds*, quoted by Dr. Bowdler Sharpe in Handbook (Allen's), vol. iv, p. 210.

the wings, and by aid of this, it can move about from branch to branch on the trees, thus protecting itself from many dangers. Mr. J. B. Quelch, curator of the British Guiana Museum, gave a very full and interesting account of this strange bird in the *Ibis* for 1890, (pp. 327-334), and Mr. Beddard had already dealt with its anatomical structure in the same magazine for 1889, (pp. 283-289.)

Mr. Beddard elsewhere says, "There is a curious bird found in British Guiana, which is known as the hoatzin. In the very young nestlings of the hoatzin the claws of the fingers are so conspicuous that they are actually used by the callow chick to climb with, before the feathers of the wings are grown sufficiently to enable them to use their wings in the proper way in which a bird should." *

Mr. Lucas' study of the wing of the young hoatzin in the Smithsonian report 1893, is a most able and interesting document. He writes:

"The wing is hooked on the points or thumbs, and by these soon after it is hatched, it can hold on to twigs, etc. Not the least of the many interesting features of the hoatzin is the rapid change which takes place in the fore limb during the growth of the bird, by which the hand of the nestling, with its well-developed, well-clawed fingers becomes the clawless wing of the old bird with its abortive outer finger."

Other cases might be cited further to show that, in exceptional instances very young birds are gifted with extraordinary powers to enable them to fulfil certain

* Mr. Beddard shows both the wing of young Hoatzin (*Opisthocomus*) and adult wing with claws aborted in Mr. Hudson's *British Birds*, pp. 15 and 17.

demands in view of self preservation and the continuance of the race, and that modifications of structure in the quite young bird prepared for even in the egg itself, are co-ordinated with other powers to enable it to effect quite special and wholly exceptional and almost incredible results. The curved or hooked fingers of the hoatzin are clearly co-ordinated with other powers that do not have, because they do not demand, such special and observable anatomical modifications; and in the cuckoo I myself believe that the zygodactyle feet, the temporary depression in the back, which remains only for eight or ten days, are co-ordinated with other powers in wings, legs, etc., to enable it to do what it does when only a few days old to turn out of the nest the eggs and young ones of the foster parents and so secure their whole attention and feeding.

The writer of a very able and interesting article on the cuckoo, under the title of "A Wonder of the Bird World," in the *Saturday Review*, for March 4, 1899, said:

"A friend of the writer saw the thing" [the turning out of the nest of eggs and young] "done last season in the case of a young cuckoo, in a sedgewarbler's nest and then, not by any means, for the first time in his life. The legs of the cuckoo, in its blind and naked infancy, may not be able to support without props the weight of the body, but by combined movements of legs, wings and body the bird does hoist up and eject from the nest of wagtail, hedgesparrow, and pipit" [and of pied flycatcher, redstart and many others], "both young birds and eggs: how it can get them out of the deeper nest of the reedwarbler one can scarcely imagine."

The power of the young cuckoo to eject the eggs and true birds from the nest, we say again, is really not more wonderful than the power of the newly-hatched dabchick for diving, swimming, etc., though the results of the efforts are so very different, or of the newly-hatched hoatzin to travel considerable distances by aid of its hooked thumbs chiefly.

Mr. Darwin was of this opinion, and these cases of ours above only support and give force to his, if, indeed, they are not more apt as dealing with birds:

"The first step towards the acquisition of the proper instinct might have been mere unintentional restlessness on the part of the young bird, when somewhat advanced in age and strength; the habit having been afterwards improved and transmitted to an earlier age. I can see no more difficulty in this than in the unhatched young of other birds acquiring the instinct to break through their own shells; or than in young snakes acquiring in their upper jaws, as Owen has remarked, a transitory sharp tooth for cutting through the tough eggshell." (*Origin*, p. 214.)

Cannock Brand (*Longman's*, June, 1891,) tries hard to explain the preponderance of cuckoo males by the fact of the males of all birds being most restless in the nest. But this for reasons we are prepared to give is certainly not exhaustive and final, if, indeed, it has any ground; and when he says that it seems "still probable that the cuckoo sometimes lays in the nest," we need only point to the fact that the shorter time spent near the victimised nest is of the very essence of success—the more, if besides depositing the egg, there is an effort made generally to extrude one of the true eggs from it.

IV.

Various theories have been advanced to account for these extraordinary powers, habits, and instincts in the cuckoo. Some have held that the individual birds must have powers to modify the colouring of the eggs to suit the nest into which they mean to deposit theirs. The writer of the article in the *Encyclopædia Britannica* rejects with scorn the idea that individual cuckoos have the power to vary their eggs in the least degree, not to speak of through such a range, and he suggests the theory that, by heredity, different sets of cuckoos come to lay always the same coloured eggs and to place them unerringly in the nests for which they are adapted, the eggs laid by the same individual bird being, he holds, always the same.

He goes on to argue that were it not so, much of the ingenuity shown by the cuckoo would be wasted, as some birds are so much more easily imposed on in this respect than others that it would in certain cases be needless labour: "We know that certain birds resent interference with their nests much less than others, and among them it may be asserted that the hedge-sparrow will patiently submit to various experiments. She will brood with complacency the egg of a red-breast (*Erithacus rubecula*), so unlike her own, and for aught we know to the contrary, may be colour-blind. In the case of such a species there would be no need of anything more to secure success. . . . . But with other species it may be, nay, doubtless is, different."

So here we really have what was a complete sliding

scale—from birds that eject the cuckoo's egg and either turn it out "or build it over," or desert the nest, down to those who seem colour-blind and unsuspicious, with all possible degrees of suspicion or innocence between.

Observation shows that eggs of the cuckoo deposited in nests of the red-backed shrike (*Lanius collurio*), of the bunting (*Emberiza miliaria*), and of the icterine warbler approximate in their colouring to eggs of these species—species in whose nests the Cuckoo rarely, in comparison with others, deposits eggs.

The facts according to the *Encyclopædia Britannica* writer, up to a certain point at all events, square with this theory. The birds in whose nests, in his view, the cuckoo most commonly deposits eggs are of the "colour-blind" variety, and more indifferent to tamperings with the nest than are the red-backed shrike, the bunting, and icterine warblers, where the cuckoo's eggs approximate in their colouring to the eggs of these species—species in whose nests the cuckoo more rarely deposits eggs.

Dr. Rey is here so far at one with Dr. Alfred Newton, he says: "Each female lays only one egg in one nest. If more than one be found they invariably belong to different females."

Most cuckoos, he holds again, "are in the habit of placing their eggs in the nests of one species of bird, and take to other nests only if they cannot find their habitual nests."

Mr. E. Hartert, at Mr. Bidwell's exhibition of cuckoos' eggs, summarised as follows on this point from Dr. Rey:

"The eggs laid in the nests of *Ruticilla phœnicurus* (redstart) and *Fringilla montifringilla* (brambling) are nearly always like those of the nest-owners in colour and markings (57 out of 67 in those of the former, and all in those of the latter). Imitations are also common in nests of *Sylvia cinerea* (whitethroat), *Sylvia hortensis* (garden-warbler), *Acrocephalus streperus* (reed warbler), and *A. phragmitis* (sedgewarbler), while they are rare in others, and never yet found in nests of *Troglodytes parvulus* (common wren), *Accentor modularis* (hedge sparrow), and the different *Phylloscopi* (warblers). In most countries, it may be said that there are many more cuckoos' eggs which do not imitate those of other birds than there are successful imitations." *

But all this, acute as it looks, removes the difficulty only a step or two further back. If the thing has become a fixed habit or instinct by heredity, then at some point the birds reached a decision on the subject as to which birds could be imposed upon more easily than others; and one fatal disadvantage pursues this theory that the earlier birds were the most discerning,

* Mr. E. Hartert wrote to meeting of the British Ornithologists' Club, 21st February, 1894, to this effect: "The statements of Dr. Rey, in his *Altes und Neues aus den Haushalte des Kuckucks*, are based upon an immense mass of material probably greater than has ever been examined by a single naturalist, and his results are founded upon a long experience. I myself can add no comment." But it needs to be emphatically remarked here that the unlike eggs are so very much more easily noticed than the matched ones, and that several, and not a few, blue eggs have now been found in nests with the blue ones of the *accentor*, and that matched eggs have been found in the nests of wrens. (See *Zoologist*, 1895, p. 228).

and, like the Cambridge carrier's horse, able to *draw* an inference.

Besides, one awkward fact recently observed by more than one person is that cuckoos have nested, or, at all events, have been seen sitting on eggs; from which it is legitimately inferred that in days remote and more favourable to the bird they did themselves brood, and that in the cases of nesting observed we have a reversion to true and original habit. The supposition that the cuckoo, having laid an egg on the ground, takes a good view of its colour, and then looks round for a nest with eggs somewhat like it, is, to our mind, so clumsy that it will not bear looking at. Nor can we accept the theory that a species should have come systematically to vary so much in a fixed and uniform way through a range of individuals and their descendants.

We are inclined to believe that there was more power of mysterious adaptation than many would be willing to credit.

Dr. Erasmus Darwin expressed his belief, based on observation, that the cuckoo *sometimes* hatches its own young; and Dr. Darwin gives an extract from a letter of the Rev. Mr. Wilmot, of Morley, near Derby, describing an instance brought to Mr. Wilmot's notice in July, 1792, by one of his labourers and afterwards watched by Mr. Wilmot himself, and seen by many other witnesses, among them a Mr. and Mrs. Holioake. Mr. Blackwall, indeed, dealt critically with this case in the *Zoological Journal* for 1829; and urged that the witnesses one and all made a mistake in thinking the bird a cuckoo, and that it was a nightjar; but this error was hardly possible to

persons accustomed to see the birds, for a nightjar brooding looks very different indeed from a cuckoo—in fact, it looks notoriously like a stump left there. Besides, there have been in a few cases, cuckoos lately observed sitting on eggs with no nest but merely a depression in earth, after the manner of the nightjar.

Dr. Charles Creighton writes on this point:

"Previous to 1771, or before Jenner, aged twenty-one, came to board with him, Hunter was known to have dissected hen-cuckoos, and had satisfied himself that there was nothing in the anatomical disposition of the viscera, as some before him had alleged, to prevent the bird from sitting on eggs like any other bird."*

In a London newspaper of September 3, 1898, we are told that in a London garden three young cuckoos might be seen fed by a pair of hedge-sparrows.

If this is correct, and, unfortunately I have not had a chance of verifying it, it would go some way in the direction of proving that the young cuckoos do not exercise towards each other the same efforts at turning out of the nest as they do towards the young and eggs of the foster-parents. And truly this would indicate wonderful instinct or reasoning; transferring the whole process from a merely blind mechanical performance to one that bordered on discrimination, foresight, and method. This in a young, blind, and as yet unfeathered nestling clearly discerning between the young of its own kind and those of the foster parents is, beyond expression, wonderful; and may

* Jenner and Vaccination, *p.* 9. Creighton quotes Daines Barrington, (Phil. Trans., vol. 62, 1771), for the first statement.

throw some light of explanation on the conduct of the great spotted cuckoos of Spain, which we shall by-and-by tell by quotation from Lord Lilford, often lay their eggs, numbering from three to eight, in the nests of the pies.

E. T. Gunn, in *Zoologist*, 1865 (p. 9628), tells of a case of two young cuckoos in one nest which lived till they were a considerable size, when one of them died.

Mr. J. H. Gurney thus closes a most interesting short paper in the *Zoologist*, for December, 1897:

"We have had two nests this year with two cuckoos in each, one belonging to a pied wagtail, and the other to a spotted flycatcher; but from what I can learn one cuckoo only was reared in each nest."

"I think," says Mr. Norgate, "we should more often find two or more cuckoos' eggs in one nest, but that I fancy the second and succeeding cuckoo would be likely to take out the biggest egg (*i.e.*, the previous cuckoo's), rather than a smaller egg of foster-parent. . . . I have found cuckoo's eggs uninjured outside the nest, and on other occasions the foster-parents' outside the nest sometimes uninjured. I have more than once found the cuckoo's egg uninjured in a nest with the foster-parent's eggs all broken, but in such cases usually found very many feathers of foster-parent and sometimes the dead foster-parent outside the nest: one often sees a scuffle between cuckoos and small birds."

Mr. J. H. Gurney writes:

"Two young cuckoos in one nest is a thing very rarely witnessed, and it has only happened in this county (Norfolk) about three times: on Mousehold Heath (as noted above), at Cringleford, and at Bracon-

ash. On one of these occasions I was told they both lived till they were a considerable size, and then one died, instead of being ejected by the other young cuckoo as might have been anticipated. The two on Mousehold were in a titlark's nest, and what added very much to the discovery was the circumstance of an addled cuckoo's egg with the young cuckoos. There must, therefore, if there was no mistake about it, have been three cuckoo's eggs at one time in the nest, a portentous prospect indeed for the poor lark!"

On the other hand, we have the following paragraph:

The Tables Turned.

An Epsom contributor to *Nature Notes* writes, September, 1898:—"I believe that when a cuckoo deposits her eggs in another bird's nest, the intruder, as soon as it is big enough, ousts the rightful nestlings. But early in June an instance to the contrary occurred in my garden. I was sitting under a tree, on the trunk of which I knew there was a sparrow's nest and young birds, as I had watched the old birds going to and fro. There was a sudden clamour and disturbance, and a young cuckoo was jerked out of the nest, and fell, with rather a heavy thud, close to my feet. There had been violent measures before the expulsion, for there was blood upon its beak, and after a few gasps—showing its bright orange mouth and throat—it died in my hand. The nest was too high—it was eight or ten feet from the ground—for me to look into it, but it would be interesting to have known how many sparrow beaks it took to serve the ejectment."

FEATHERED CUCKOO AND YOUNG BIRD IN AMITY.

Or whether another cuckoo chanced to be in that nest—a thing which, if ascertained, would have been important.

Mr. Howard Saunders positively asserts that the same female sometimes deposits two and even three eggs in one nest; and that where there are two cuckoos in the same nest the struggle for existence is sometimes severe.*

Jenner's report is absolutely in favour of the theory that the young cuckoos act towards each other precisely as they do towards the true occupants of the nest. I do not, however, implicitly pin my faith to Jenner, and wish—devoutly wish—for well verified observations of others on this point to enable me and others finally to accept or to reject what is implied in the following passage:

"Two cuckoos and one hedge-sparrow were hatched in the same nest; one hedge-sparrow's egg remained unhatched. In a few hours a contest between the cuckoos for the possession of the nest, which continued undetermined till the afternoon of the following day, when one of them, which was somewhat superior in size, turned out the other, together with the young hedge sparrow and the unhatched egg. The combatants," he says, "alternately appeared to have the advantage, as each carried the other several times nearly to the top of the nest, and again sank down depressed with the weight of its burden; till, at length, after various efforts, the strongest prevailed, and was afterwards brought up by the hedge-sparrow."

In the case of the two young cuckoos in a meadow-pipit's nest, observed by Mr. John Craig, he thought

* *Manual of Birds*, p. 278.

that the eggs had been "deposited by two different birds, as they were different in colour, size and shape, but I do not mean," he goes on, "that the same cuckoo would not lay eggs quite as different in colour, size and shape. One or more of the nest owner's eggs must have been removed by one of the cuckoos, as she is in the habit of doing so, by swallowing them, *when a full clutch is laid before she deposits her own*, and I have never seen a meadow-pipit's nest with fewer than four eggs to the clutch." . . . . These two birds had a tremendous tussle, though, says Mr. Craig, "they were not two days old and blind."

He goes on to write:

"We again visited the nest on June 9th to take a snapshot, when we found only one of the cuckoos in the nest and the other one outside. Having a young pipit with us we put it in the nest. The young cuckoo hoisted it again and again on its back, but the pipit always got jammed near the top of the nest. We then put in the other cuckoo, when a desperate struggle commenced. Sometimes the birds put their bill or head against the opposite side of the nest for more pressure when commencing to climb. Several times the top bird tumbled over the head of the other, like a rider falling over the head of a horse. After a short respite the birds became extremely restless, and again commenced the struggle. Two snapshots were then taken, but they were useless."

"I again visited the nest with Mr. Barron, June 10th, when we found only one of the cuckoos in the nest, and the other one outside; but the photographer failed to put in an appearance, having got otherwise engaged. We then put the other cuckoo into the nest

again, when the one that was in possession began to hoist it once more on its back, and climbed up the side of the nest backwards, and threw it out of the nest, which it had little difficulty in doing, as the bird was so weak from want of food. We then put the weak bird into the nest again to give it a chance to recover, and took the other one away with us for about an hour. We then put it into the nest again, when the weak bird made several attempts to eject its companion, but it was too feeble. It then acted on the defensive, by lying in a canted position by keeping the side that was next its opponent downwards, with one of its legs stretched out, and its claws against the opposite side of the nest. We then bolstered up the nest to give the weak bird a chance to recover. On the following day I again visited the nest, but the weak bird had disappeared altogether. The parent birds paid no attention whatever to the young cuckoo when outside the nest, even although sitting at the side of it."

These facts, from a very reliable field-ornithologist, taken in connection with others we have given, suggested the question:

Is it possible that instinct as to birds from the same mother cuckoo in one nest indicates the cases in which two cuckoos in one nest lie apparently quite amicably together, while those from different hens bear themselves toward each other precisely as they do to the legitimate birds of the nest?—try to turn each other out and fight till the strongest prevails? Mr. Craig believed that in above case *the eggs were from different hens.*

We cannot, at all events, see anything whatever in

such procedure likely to be advantageous to the species!

The evidence is, however, by no means satisfactory or conclusive that, when two cuckoos' eggs are dropped into one nest the two cuckoos invariably try to turn each other out—the strongest finally prevailing. We have just cited two cases where this was not the fact, and others might have been added.

Yet, Mr. Romanes, with the unfortunate tendency to generalise from too narrow a basis of particulars, writes thus:

"Among birds we find mistaken instinct exhibited by the cuckoo when it lays two eggs in the same nest, with the *inevitable result* that one of the young birds will afterwards eject the other." *

And in not a few of the cases it is plain that there was no mistaken instinct at all in the sense Mr. Romanes means, because in not a few nests it would be simply impossible to see the former deposited cuckoo's egg: unless Mr. Romanes indeed supposed that these second eggs are invariably deposited by the same bird that laid the first egg—a thing about which we are still in the greatest uncertainty, and certainty regarding which would clear up a lot of other things for us. Meantime Mr. Romanes's words above are only like too many of his—a doubtful point assumed as certain and absolutely settled, and then a bold, big argument, dogmatically raised upon it!

In cases where cuckoos' eggs have been deposited in blackbirds' or pigeons' nests there would be a more equally matched contest between the young ones of the different parents from their size; but in some

* Romanes's *Ment. Evolution*, p. 168.

cases, both of blackbirds and pigeons, it has been found that the eggs of the blackbird or pigeon had been punctured or cracked by mandibles to prevent hatching, that so the young cuckoo might not run the risk of such an equal contest. This shows still further forecast and ingenuity on the part of the parent cuckoos, if we are right in inferring, as we are surely forced to do, that the parent cuckoos were here the malefactors; and also may be taken to prove that the cuckoos in certain ways do in so far look after the welfare and safety of their progeny. Darwin tells us that the *Molothrus bonariensis* (American cowbird) has the most extraordinary habit of pecking holes in the eggs, whether of their own species or of their foster-parents, which they find in the appropriated nests,* and to this we shall refer again with evidence from first-hand reporters.

V.

A WRITER on "British Birds: their Nests and Eggs," in the *Cornhill Magazine*, says:—

"It was once thought that the cuckoo paired, but it is now known that the species is polygamous.† The number of hens that constitute a harem is not known, but from the number of bachelor birds the males must greatly predominate over the females. The egg of the cuckoo has been found in the nests of sixty different species, several of which are exceedingly

* *Origin of Species*, p. 215, 6th edition.

† Not polygamous, surely, but polyandrous, and instead of harem, with a number of hens, the question must be how many cocks attend one hen?

small, and moreover domed.* Among the sixty nests patronised were the unlikely ones of the butcher-bird, jay, and magpie—all either bird or egg destroyers. This may seem to reflect on the cuckoo's stupidity; and the bird certainly exhibits deplorable ignorance of the fitness of things when it deposits its egg in the nest of the diminutive goldcrest, or the cumbersome one of the cushat. A goldcrest might conveniently be stowed away in the gape of a young cuckoo without the latter detecting that the morsel was much more than a normal supply. The nests in which the eggs of cuckoos are most frequently found are those of the meadow-pipit, hedge-sparrow, and reed-warbler. Now the eggs of these birds vary to a very considerable degree; and the question arises whether the cuckoo has the power of assimilating the colour of its egg to those among which it is to be deposited. Certain eminent continental ornithologists claim that this is so, but the facts observed in England hardly bear out the conclusion. Brown eggs have been found among the blue ones of the the hedge-sparrow, redstart, wheatear; among the green and grey ones of other birds; and the purely white ones of the wood-pigeon and turtle-dove. *The cuckoo's egg is brown*, and it must be admitted that the great majority of the nests which it patronises contain eggs more or less nearly resembling its own. There is a general family likeness about those laid by the bird, not only in the same clutch, but from year to year. Admitting that the eggs of the cuckoo, as a species, vary more than those of other birds, it is yet probable that the same female invariably lays

* Exactly double sixty Mr. Bidwell gives.

eggs of one colour. This can only be surmised by analogy, though the one fact bearing on the question is where two cuckoo's eggs were found in the same nest [and] which differed greatly. More might have been learnt from the incident, had it been known for certain whether the eggs were laid by the same or different birds. There is a general tendency in the habits of animals to become hereditary, and it seems not unreasonable to suppose that a cuckoo which has once laid its egg in the nest of any particular species should continue to do so, and that the young cuckoo should also continue the practice in after years."

Mr. Seebohm's reproductions of cuckoo's eggs, however, show that this writer was in the greatest possible error in declaring the cuckoo's eggs to be invariably brown, which suggests the idea that, while right on some points, he wrote from imperfect knowledge in others, and was not himself a close observer.

Mr. Bidwell's list gives 120 species in the nests of which the cuckoo drops its eggs, and in the *Zoologist* for 1883 he writes that "five eggs are said to be laid in the season by the cuckoo at intervals of seven or eight days;" but this is surely an exaggeration. It is probable, however, that the cuckoo has more power than other birds in retaining perfect eggs in the ovary —a point supported by a fact thus given by Mr. J. H. Gurney:

"Our Norwich bird-stuffers have on two or three occasions taken perfect eggs out of cuckoos, which indicates some latent power of retaining them in the ovarium—a power long ago suspected by Montagu."

Mr. Romanes, in his *Animal Intelligence*, writes in a note at the end of his chapter on "Bird Intelligence:"

"Since going to press, I have seen, through the kindness of Mr. Seebohm, some specimens of cuckoo's eggs coloured in imitation of those belonging to the birds in the nests of which they are laid. There can be no question about the imitation."

Dr. Baldamus, in *Naumannia*, vol. for 1863-4, (p. 414), gives sixteen coloured drawings of eggs of common cuckoo—all very different indeed, from the blue of the redstart and hedge-sparrow and pied fly-catcher to the brown-blotched eggs of larks and pipits.

The late-lamented Mr. Henry Seebohm, on the whole a careful observer, despite Professor Newton's depreciation, as well as an exquisite writer, in his plates of birds' eggs, appended to his *History of British Birds*, gives fifteen cuckoo's eggs which vary through a wide range, one or other of which might fairly simulate the eggs of the hedge-sparrows, redstarts, pipits, fly-catchers, warblers, little buntings, wagtails, tits, and some of the finches, wrens, and blackcaps. One of these has undoubtedly a blue tint which would make it admirably adapted to impose even upon the redstart, or the pied fly-catcher, or the accentor—*pace* Mr. Luke Ellis, who in the *Echo* some years ago, ridiculed the idea that a cuckoo could lay a blue egg. But Mr. Seebohm was of another mind. He wrote:

"A cuckoo which lays blue eggs always lays blue eggs, and its descendants will continue to lay blue eggs; it was probably hatched in a nest containing blue eggs, and will, to the best of its ability, intrust the care of its eggs to foster-parents of the same species as those which tended it in its infancy. . . . It is very seldom that the cuckoo's egg is found with-

out small round dark markings, like fly spots. . . . I have taken a young cuckoo out of a blue egg on which they were so pale as almost to escape notice."*

Mr. Dresser gives the following very interesting passage from Mr. Seebohm's notes on Mr. Pralle's collection at Hildesheim:

"In this collection are twelve blue cuckoo's eggs, some uniform, unspotted, whereas others have faint spots, like fly spots, here and there. The first of these was in a nest of *Saxicola stapazina*, and is blue, with a few fly spots; No. 2 ditto; Nos. 3 and 4 are unspotted blue, and are each with five eggs of *Phylloscopus sibilatrix;* No. 5 is with three eggs of *Ruticilla phœnicurus*, and No. 7 with three eggs of the same species, this latter egg being blue, with a few faint fly spots; Nos. 8, 9, 10, 11, 12 are all blue, with traces of spots, and are all with four or six eggs of *Ruticilla phœnicurus* except the last which was found with only one egg of that species."†

Mr. J. H. Gurney, in his admirable paper in the *Norfolk and Suffolk Natural History Society Journal*, well says:

"Our cuckoo lays blue eggs oftener than is thought, and *Coccystes jacobinus*, a cuckoo inhabiting Africa and India, always lays them: to say blue cuckoo's eggs have never been met with in England is quite incorrect. . . . In one nest we learn the blue egg was a very little larger than a hedge-sparrow's, *but it produced a cuckoo, which only shows how easily they may be passed over.*" [Italics are mine.]

In the second volume of Dr. Bowdler Sharpe's

* p. 384, vol. i.

† *Birds of Europe, ad loc.*

Handbook of British Birds, we find him following Mr. Seebohm in the idea that the cuckoo which lays blue eggs had itself come from a blue egg, and always lays blue eggs, and so with the other coloured egg-laying cuckoos. But this seems to carry the great difficulty only one short step further back. How did the cuckoos get differentiated into different coloured egg-layers? It could not have been before the habit had been formed of putting the eggs into other birds' nests. If the cuckoos, then, became at one step definitely classed as blue egg-layers, fly-spotted blue egg-layers, light-brown blotched egg-layers, or dark-brown blotched, or lark-like egg-layers, and so on, is that not even as much a mystery as though we were to allow *some* individual variation in the coloration of eggs? Let anybody look at the fifteen different eggs of the cuckoo carefully engraved and coloured in the supplement of Seebohm's *British Birds*, or at the sixteen coloured specimens from Dr. August Baldamus in *Naumannia*, and he will admit that something wholly unexampled and exceptional must apply to a class of birds producing such varied eggs. The problems connected with the cuckoo are not yet by any means settled; so there is an interesting field of observation and inquiry still left open for any ambitious young naturalist.

Among the blue eggs of Mr. Pralle's collection, Mr. Seebohm speaks of blue eggs uniform, unspotted, and of others with spots,—faint spots, like fly-spots. Now, what I wish to ask on this head is, are the uniform blue eggs confined to one bird or definite family of birds, and each of the variously fly-spotted eggs to another bird or class of birds. By this process we

should have another lot of different eggs, say, six to add to our differentiated cuckoos, and, following the same reasoning applied to all slight differences, we should have at least another half-dozen, thus bringing the number of known different egg-laying cuckoos up to at least nearly thirty. It would be a benefit if the supporters of the theory of different cuckoos for each different egg would tell us at what point of difference you have assurance of the fixed and definite maternity, so to speak. Some such rule of principle is much needed. Do the various fly-spots and different distribution of fly-spots (for in some cases they are freely and almost equally scattered at one end, and in others drawn into a sort of faint ring between the end of the egg and the part where it begins to contract), each trace themselves to definite cuckoos; or at what point does the process end? We know perfectly well that when *closely* looked at there is no case in which any birds' eggs are exactly alike, and that sometimes the eggs of one clutch—more especially of certain birds—will so markedly differ from each other as to spots and arrangement of spots as to look rather a motley group; and if in the case of the cuckoo no variety is to be allowed to the female here, we want to have some clear rule about it. We know nothing definite about what determines these differences, but our point here is, that if you go the whole hog, as you ought to do, about your different egg-laying cuckoos, you foist on the *individual* layers a uniformity such as is found in no other bird—a thing adding another mystery to the mysteries about the cuckoo and its eggs.

In case of any dispute, here are Dr. Bowdler Sharpe's own words:

"It is supposed that the colouration of the cuckoo's egg is an *hereditary* faculty, and that each female cuckoo lays a particular type of egg. This is in all probability the case, and cuckoos which lay blue eggs come of a stock which has been hatched from blue eggs, and will continue to lay them and *deposit them in the nest of some blue-egg-laying species.*"*

Set this against the following: "In none of the hedge-sparrows' nests, for instance, have we a blue cuckoo's egg." Another authority puts it that canorus "will by preference lay in the nest of the species which brought her up." The great comparative number of blue cuckoos' eggs laid in the nests of birds with brown-blotched and even lark-like eggs, and, more still, eggs like those of the nightingale, suffices to prove that there must be so very many exceptions to the rule laid down in the words italicised above that it is completely invalidated, and so far as that point is concerned cannot be said to give force to the reason for the production of blue eggs in certain families of the cuckoo. It is a very good theoretic reason to justify, as it were, a hard and fast theory of radical differentiation of cuckoos into blue egg-laying and other egg-laying families; but facts are against it clearly enough; seeing that in so many instances the blue eggs are *not* laid in the nest of some blue egg-laying species—and *thence* a mere waste of more specialised colouration—since, surely, it would have been a gain to have better matched the eggs, were it only that bird-nesters and even ornithologists might have been more completely and longer deceived; though it is difficult to see how if, in times past, blue

* Allen's Handbook, ii, p. 28

eggs of the cuckoo were as liberally laid among clutches of a wholly different colour, as they are now, English ornithologists could have gone on from the days of Jenner down to those of Seebohm and Elwes —about a whole century—and denied that any cuckoo whatever laid blue eggs. It is almost incomprehensible that such a condition of things could have gone on—unless indeed the facts were different in the past from what they are now and have been for several recent years, when one of the most extraordinary things has been the appearance of cuckoos' blue eggs not with blue eggs, but with eggs of all other and contrasted colours, even in the nest of the nightingale. If this had been so invariably for nigh a hundred years, what utterly blind bogglers English ornithologists must indeed have been !

Further still, Mr. Howard Saunders says (right in teeth of Dr. Bowdler Sharpe's deliverance above) that eggs of a pale blue have been found, though not *invariably located, in nests of the hedge-sparrow and redstart.**

If you go strictly for a blue-egg-laying cuckoo as having come from the nest of a blue-egg-laying bird, always laying its eggs in a nest where blue eggs are, how do you account for the very, very large number in proportion of blue eggs laid beside other coloured eggs, making in many cases very motley groups ? And if, like the hedge-sparrow, there are whole species that are easily taken in, and will bear any amount of interference with their nests—birds which are everywhere numerous—why should the cuckoo need to

* *Manual*, p. 278. Mr. Saunders writes in new edition of 1897-8, " though these have not invariably been located."

have recourse to such as demand exact matching of eggs as Professor Newton above has told us? In every case of that kind the cuckoo takes on itself a lot of trouble for nothing. And, besides, what do you make of the bird out of a blue egg that was laid in a brown blotched egg-laying birds' nest—would it, when its turn came, choose a blue-laying bird's nest to drop its eggs in, or would it choose the same kind of nest as that it came out of?

Dr. Bowdler Sharpe has yet this problem to solve and this question to answer. Thus the two statements of tendency expressed in the one case, as continuing to deposit the blue eggs *(à la* Dr. Bowdler Sharpe, Seebohm, and Professor Newton) "in the nest of some blue-egg-laying species," and in the other, as "by preference laying in the nest of the species which brought her up," are almost through the whole range exclusive of each other, simply because such a large number of blue eggs are laid, not in blue-egg nests, but in others. The two tendencies cannot be brought into harmony in view of facts.

Even so late as 1873, as the much cuckoo-laden volume of the *Zoologist* for that year bears witness, Professor Alfred Newton was very sceptical about blue cuckoo's eggs, openly expressing doubts as to the correctness of Dr. Baldamus's report in that particular, and so positive was he that the Rev. Alfred C. Smith, after citing from a letter to the *Field*, Mar. 15th, 1873, where the Professor declared, that so far as he was aware, "no one has ever found in the nest of a hedge-sparrow a cuckoo's egg which is similar to that of the hedge-sparrow," simply went on to print

the following letter from a friend—a gentleman whom he could absolutely trust :

Dear Sir,

I have found the cuckoo's egg several times in the hedge-sparrow's nest, and once two eggs, but varying from each other both in colour and size. Having a doubt whether both belonged to one cuckoo, or even one of them to a cuckoo at all, it being, if almost, as intense a blue as the hedge-sparrow's, but very little larger (the other being much lighter in colour and freckled at its larger end), I determined to watch the nest, which contained four hedge-sparrow's eggs besides the cuckoo's two eggs above mentioned. Of the hedge-sparrow's eggs, one was somehow lost ; the rest were all hatched, but one of the young cuckoos died after two or three days' existence (I believe from being too freely handled and exposed) : the other managed, in about a week's time, to get rid of its companions, and when fledged was himself made a prisoner, lived some months in a cage, and then moped and died. I have also found the cuckoo's egg in the wagtail's nest (though how it got there I could never tell), in the yellow-hammer's and chaffinch's nests, and I have known it found in the thrush's nest, and in all of these I have been remarkably struck with the similarity of colour with the eggs of the different birds in whose nests they were ; indeed for several years I had the egg from the thrush's nest, which could scarcely be recognised from the egg of the thrush in size, colour, or in markings. I will add only one other fact : that I have found a cuckoo's egg in a hedge-sparrow's nest two years in the same hedge, which induces me to think it probable that both eggs may have belonged to the same bird. As the facts above stated are strictly within my own knowledge, you may make what use of them you please.

J. E. Brine.

Abbey House, Shaftesbury.

And about the same time, Mr. Henry Hadfield, Ventnor, Isle of Wight, in *Zoologist*, June, 1873, in replying to some of Professor Newton's statements

about hereditary influence on cuckoo's eggs, said :— "I do not see why the presumed habit should be more likely to be hereditary in the cuckoo than in any other species. Mr. Newton, it is true cites an instance or two of there having been a family likeness found between the eggs laid by the same bird, so that they could be readily distinguished from others ; but these rare—not to say accidental—varieties in the colouring of eggs may arise from different causes—for instance, the age of the bird or defective organization. The eggs of many birds are found to vary more or less in colour, — the eggs of the common house-sparrow, for instance,—though I know of no regular or permanent varieties in the species."

And, let Professor Newton now reconcile it how he may, we are fully assured that, in this last sentence, Mr. Hadfield, from his point of view, is right.

VI.

THE peculiar formation in the cuckoo which is said to prevent incubation is shared in greater or lesser degree with other birds which do incubate. This malformation results from the stomach lying beneath the sternum ; but the nightjar is so formed, and yet it broods its own young ; and more recent investigators show that at least one other brooding bird has the same form ; while the two common North American cuckoos have the same form, and yet brood *some* of their eggs and young ones. The cause of the habit must therefore be sought in other sources.

Herissant attributed the non-brooding of the

cuckoo to the position of the gizzard; which is placed further back on the abdomen, and is less protected by the sternum than in other birds. But all these points are efficiently met by the results of the dissections of Hunter, already referred to at p. 42.

With regard to the theory that the same female invariably lays eggs of one colour, the observations of Herr Adolf Müller, communicated to Westermann's *Monatshefte*, raised difficulties.

On the 16th of May, 1888, Herr Adolf Müller was crossing a wood, when a cuckoo started from almost under his feet. He examined the ground carefully, and discovered beneath a tussock of grass, in a little hollow, three eggs. The first was light yellow with brown spots, the second orange with greenish lines, the third, smaller than the others, was of a greenish grey with minute red spots and blotches of reddish brown. Herr Müller, with true German patience, came every day, and, by the aid of an opera glass, observed, without disturbing her, the habits of the extraordinary bird, which chance had revealed to him. She proceeded to sit with irreproachable regularity. In ten days a young one was hatched. The mother abandoned the two sterile eggs and devoted herself to the little cuckoo, whom she sheltered under her wings in the keen morning air, and supplied with caterpillars from a neighbouring oak copse. In three weeks it could fly; whereas under the care of foster parents young cuckoos do not master that accomplishment until after the lapse of six or seven weeks.

Herr Adolf Müller draws from these observations the following results: *Ibis* 1889, p. 219.

1. That the cuckoo, in exceptional circumstances,

incubates and hatches one or more of its own eggs, which, in these cases it apparently lays together in a safe place on the ground, without preparing any nest.

2. That the eggs of the same cuckoo may be very different in colour and markings. If this be so, the purely theoretical idea held in certain quarters, that each hen cuckoo lays eggs of the same colour and markings, and of "one beautiful type," which are destined to be laid in the nests of one particular species of small bird, and are rarely the same colour as those of the foster-mother, and that she only lays them in the nest of this species, falls to the ground.

I am perfectly aware that certain ornithologists and ornithological societies were well inclined to discredit Müller and to reject his report; but, taking his observations in connection with those of Dr. Erasmus Darwin and Mr. Wilmot, and, more recently, observations as reported, I think, in the *Field* of a case on Wimbledon Common and some observations of my own, I am not so certain that there may not be something in Herr Müller's report. Certain of the ornithologists who rejected Müller were the very men who had obstinately insisted for years and years that cuckoos never laid blue eggs; and some of them, to save their *amour propre*, would fain deny them still.

There is also the case of Herr Kiessel and three other eye-witnesses who reported that in the end of May, 1868, a cuckoo reared her young in a wood near St. Johann. Kiessel observed the bird regularly and saw that both the eggs were hatched and the little birds reared with tenderness and care, and the whole story was told and verified in the German *Gartenlaube*.

Since then there have now and again been notes made by observers to the same effect. An Essex naturalist, with whom I am acquainted, declares an experience of the same kind. It is evident that the cuckoo at one time—though a remote time—nested and brooded its own eggs and young, and there is surely no impossibility in reversions to original habit in rare circumstances here as is found to be the case in many other instances.

If it is argued that other birds' eggs vary to a much greater extent than is believed by any but systematic ornithologists, it is enough to say that this is beside the mark, because, so far as we know, there is no object in this variation: it is matter of accident or change of physical condition; but it is wholly different with the cuckoo, because in its case there is an object—an object of the most definite kind. Its success must depend either on the stupidity of certain birds, or on its own cleverness and power of imitation, so far as certain other birds are concerned; and, since it can never know beforehand exactly what may be required of it—as witness the case of the reed-warbler which buried two cuckoo's eggs because it could not turn them out (and to this we shall refer again)—the very existence of the race depends on deception or studied colouration of eggs up to a certain point, so far as certain birds' nests are used by it.

If there were no difference in the powers of birds in discriminating and rejecting, the problem to our mind would be much simplified from the point of view of Professor A. Newton, but he, alas! is very clear on the difference, and indeed makes all he can of it.

VII.

In the cases at the South Kensington Museum devoted to birds' eggs and nests, we find in those set apart for the clutches among which the cuckoo's eggs were found, one case in which the blue eggs of the *Accentor modularis* (hedge-sparrow) were exactly imitated as to tint, though the cuckoo's egg was a good deal larger than the sparrow's; in three other cases brown spotted eggs lay beside the sparrow's pale-blue ones; and another blue egg beside blue eggs of the redstart, only larger; while, with regard to reed-warblers, yellow wagtails, white wagtails, aquatic warblers, garden warblers, pied wagtails, the eggs had a general likeness, but were larger, and some of them some shades darker. In a few cases—that of the meadow-pipit especially, on which the cuckoo very frequently imposes—the eggs were markedly lighter—much lighter and larger. The cuckoo's egg was much darker than those of the yellow-hammer beside it, and the intruded egg was very unlike those of the willow-warbler—much larger and darker.* Dr. Bowdler

* Nor can there be, on my part, any error of memory or lapse here; for a writer—very exact and reliable—in *Chambers's Journal* for August, 1899 (since this book was written), in an article on "Cuckoo Mimicry," has this paragraph:

"The hedge-sparrow—the most frequent foster-parent of the cuckoo—lays a turquoise blue egg, whilst the ordinary colour of the cuckoo's egg is a dull speckled-brown, very like that of a sky lark. In the Natural History Museum collection there are six clutches of eggs of the hedge-sparrow, each containing a cuckoo's egg. The localities from which they come are: (1) Brighton, (2) Hayward's Heath, (3) South West Lancashire, (4) North West Cheshire, (5) and (6) Hampshire. In the case of No. 1 (Brighton)

Sharpe assured me, however, that they had in reserve many blue eggs of the cuckoo; which just leads to the question, in what proportion of cases the brown-spotted eggs are intruded into the hedge-sparrow's nests, as in the three cases noted above.

Here arises a difficulty about the theory of the cuckoo always laying eggs the same colour. For, if the blue-laying cuckoos know the hedge-sparrow's nest, and use it, these facts would indicate failure on the part of the cuckoos who lay brown-blotched eggs, and place them too in the nests of accentors, or lay blue or bluish eggs in the nests of birds which have brown, or brown spotted, or blotched eggs. I myself, in Essex, last year (1898) found two blue cuckoo's

the cuckoo's egg is the counter-part of the hedge-sparrow in texture and colour, though almost twice as large—a wonderful instance of mimicry. In all the other cases (Nos. 2—6), the cuckoo egg is the ordinary dull speckled-brown—a striking contrast. In the case of two other species—the pied fly-catcher (Silesia), and the redstart (Vaalkerstaad), both of which lay blue eggs—the cuckoo imitates their colour, but the egg is much larger.

In the following instances the imitative colouring is very perfect: Lesser whitethroat, mottled greenish-grey (Halle, Saxony); orphean warbler, white pale greenish-blue, spotted (Malaga); garden warbler, buff-speckled (Brandenburg); blue-headed yellow wagtail, grey speckled (Frankfort-on-Oder); barred warbler, pale mottled green (Alsace); meadow pippit, reddish brown (North West Cheshire); white wagtail, grey speckled (Germany); linnet, white greenish spots (Germany). In the case of the red-backed shrike or butcher-bird (Marne), the resemblance between the two eggs in size and colouring—cream body colour with reddish cloud at the upper end—is so remarkable that one might be pardoned for imagining that there had been some mistake." And yet in spite of the words in this extract, put in italics by me, Dr. Bowdler Sharpe unaccountably says there is no record of a blue cuckoo's egg in a hedge-sparrow's nest!

eggs in hedge-sparrow's nests, and also two brown blotched cuckoo's eggs in hedge-sparrow's nests. I do wish observers would make careful note of this, that some idea of the proportion obtaining in these matters might be reached, and further inferences as to the cuckoo's power and knowledge carefully drawn from the facts observed.

In the collection of clutches of eggs in the British Museum, are cuckoo's eggs showing the exact colour and markings of the eggs of the birds victimised: "pied wagtails, yellow wagtails, blue-headed wagtails, meadow-pipits, tree-pipits, skylarks, chaffinches, reed-warblers, and sedge-warblers, orphean-warblers, etc." So says Dr. Bowdler Sharpe, in effect, and he thus further notices curious points:

"The small size of the egg laid by the cuckoo, considering the bulk of the bird, is another peculiar feature in its economy. Great diversity of colour, also is one of its characteristics, and considering the various types of eggs laid by the cuckoo, it is not wonderful that the theory exists that the bird places its eggs in the nest of a species, the eggs of which most resemble its own in colour. That there is great truth in this theory I firmly believe, otherwise, it would be difficult to account for the fact that blue cuckoos' eggs should be placed in the nest of a redstart, which likewise lays blue eggs. In the British Museum are such clutches of eggs, and also blue eggs placed in the nest of a pied fly-catcher, the eggs of which are also blue. The fact of the cuckoo producing a blue egg was for some time doubted in England, though well known in Germany; but the question was set at rest by two English ornithologists, Mr.

Henry Seebohm and Mr. H. J. Elwes, who were collecting together in Holland, and who received a nest of redstart's eggs, one of which, larger than the rest, was said to be that of a cuckoo. The eggs proved to be hard set with well formed young inside. They were alike blue in colour, but in trying to blow the larger egg, the foot of the little bird, a zygodactyle foot, protruded from the whole, and effectually proved that the tiny occupant was a veritable cuckoo."*

And Dr. Bowdler Sharpe tells of the experience of his friend, Mr. C. Bygrave Wharton, who discovered a nest of the sedge warbler, with cuckoo's eggs in it, only distinguished from the true eggs by being larger; and some days afterwards he found an egg precisely this same sedge-warbler type in the nest of a reed-bunting, whose eggs are very different. This seemed to show that the egg laid by the cuckoo was like that of the sedge-warbler, and that on the first occasion the cuckoo had found the matching nest ready to hand, but, in the case of the second egg, no sedge warbler in the neighbourhood had been found with a nest ready, and so the cuckoo was forced to put it into the nest of the reed-bunting.

But, unfortunately, as we think, Dr. Bowdler Sharpe does not press forward certain facts that would have still further strengthened his position here. On another page we find him saying:

"In none of the hedge-sparrows' nests have we a blue cuckoo's egg, and it is curious to find an egg like that of a skylark or a tree-pipit deposited in the nest

* "The zygodactyle foot," as said already, simply means that the bird has two toes to the front and two to the back—a point in which but a limited group of birds any way resemble it.

of a warbler or chiff-chaff—the eggs of it are so differently coloured that the sombre cuckoo's egg lies in striking contrast." *

But, as I said already, in the British Museum, one of the clutches has most distinctly a blue cuckoo's egg beside the accentor's eggs, that of the cuckoo being only noticeably larger; and in another clutch there a blue cuckoo's egg lies beside the five blue eggs of the redstart, here, too, only a little larger than them, but in tint exactly matched. It is clear that the intention of a blue egg is to be laid with blue eggs; and if we could but definitely get at the causes of the cuckoo's power so to place it, we should be some steps nearer to a true understanding of this bird.

Many instances we have now of blue cuckoos' eggs in nests of hedge-sparrow. Professor Newton writes:

"One was recorded in *Zoologist*, 1873 (p. 3526), on Mr. Brine's authority, and a few others have since been recorded." † We have heard of several quite recently and ourselves found two in North-East Essex the season before last and one last year so alike in tint that only a slight excess in size betrayed them: and there is Mr. Read's specimen exhibited in Mr. Bidwell's exhibition.

* Handbook, ii, p. 28.

† *Dictionary of Birds*, i, p. 121. [Now, this is not correct: Mr. Brine, as we have seen, declared the finding of such *several times*, and in the specific case referred to there were *two* cuckoos' eggs—one as dark blue as the hedge-sparrow's, the other lighter. If Mr. Brine was to be believed about one, he should have been believed about the rest, or else very distinct reasons given why he was believed about the one and not about the others. Discrimination is good; but picking and choosing with birds are sometimes not so good.]

Mr. Bidwell has found the egg of the cuckoo in the nest of the reed-warbler twenty-two or twenty-three feet from the ground, and I have found it at even a greater height in that of the jay and wood-pigeon. Nor is this, according to Mr. Bidwell's view, any accidental or occasional case, since he holds that cuckoos which lay eggs in nests high in trees come of a class which always do so—a point in which I for one am inclined to agree with him. These nests are so removed from the examination of the ordinary boy bird-nester that he is little likely to examine carefully or exhaustively all such nests in a given area. In this fact alone we have a suggestion of a much wider deposition of cuckoos' eggs than is usually conceived —and this the more especially—and it needs to be emphasized here if, as Mr. Bidwell holds, those cuckoos which deposit their eggs in such lofty nests will always choose such nests if they are to be found within their beat.

In the *Zoologist* for 1883 (pp. 372-3), Mr. Bidwell contributed a very interesting note, telling how, in a certain small area near his house at Richmond, he had found, in different nests of the reed-warbler, four cuckoo's eggs so alike in their markings that no ornithologist could doubt they were laid by the same bird; and he drew certain inferences from his facts: (1) that the cuckoo does not always turn out one of the victim's eggs for her egg; (2) that a cuckoo will always use, if she can find it, the same class of nest to lay her egg in; and (3) that the cuckoo does not wander far if she can find fitting nests to put her eggs in; and (4) that cuckoos that lay in high nests will always prefer high nests, as in this case each

nest that had a cuckoo's egg in it "was high and had to be climbed for;" and (5) that the number of cuckoo's eggs laid in a season is five. Mr. Bidwell is very careful and exact usually, but here there are a great number of mere assumptions: (1) the cuckoos' eggs laid in low nests would be more exposed to many enemies — bird-nesting boys and collectors, not to speak of vermin; (2) he admits the possibility of other grounds that he could examine being used by the assumed identical cuckoo, and thus he has simply to *suppose* certain things; and (3) after all, the identification of the one cuckoo is mere inference from egg-markings and *is* an assumption — no more. I should like to know if Mr. Bidwell pursued these same investigations on that area, as I do not find any record of them in the *Zoologist* for 1884; and if he did, then, unfortunately, I have missed his report of it, and would be glad to know his later specific results in this little area; but, so far as this writing of his goes, I do not regard either his assumed facts or his inferences as so entirely convincing as he seems to think them.

VIII.

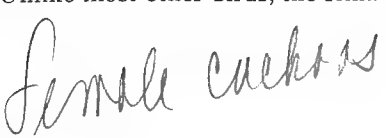
VARIOUS theories have been advanced to account for the origin of these habits in the cuckoo. It is a very voracious feeder, and the food which it favours, hairy caterpillars—more especially those of the tiger-moth (*Arctia caja*), commonly known as the "woolly bear," —has become so scarce very often, through woods cut down and other changes, argue one set of naturalists, that it would not be able to satisfy itself and

to provide for a brood also. The young of the cuckoo are so voracious that it has been observed to be hard work for a pair of foster-birds to satisfy the ravenous maw of one. Indeed it has been set down as an established fact that the young cuckoos struggle to eject *each other* from the nest if put together, and the stronger survives, but this is not yet sufficiently or finally proved. Though there has been much exaggeration about time between layings, the cuckoo, as we have decidedly seen, does not deposit her eggs quite so rapidly as some other birds. Whether this slower deposition of eggs has been encouraged by later habits, or was original to the bird, may well be an open question; but in the former case you would have a very marked departure from general habit; in the latter you have the survival of a species in face of such drawbacks in its own habits and tendencies as is at least exceptional almost beyond belief.

The whole question of the migration of the young cuckoos later than the parents is one which also involves something like mystery. Had they from hatching lived along with their true parents, there would not have been so much to wonder at in their following them; but having been so far reared apart, and having so far lived apart, their migration forms, perhaps, one of the strongest illustrations of the power of inherited instinct that we have.

Inherited instinct! Yes: if it were not that there is so much to suggest that the cuckoos were originally quite like other birds in all the points in which they now so much differ from them. In truth, nothing is more misleading than this word instinct.

Unlike most other birds, the female cuckoos are, as



already said, in a great minority compared with the males; so that in a sense there is hardly true mating. This is another fact of the most singular character; because, on one side, it suggests that some explanation of the parasitic tendency in cuckoos may be found in the comparatively low development of the parts subservient to generation, the small eggs of some, and a consequent weakening of the parental impulses; though this may be so far met by the fact that the males clearly suffer in this respect more than the females, and by this other and further fact, that some of the parasitic cuckoos, the species of *Coccystes* amongst them, still lay normally sized eggs.

We found the following description of the conduct of the female cuckoo towards the males in one of the best authorities:

"It not infrequently occurs that three or four males are in full chase of a female, who entices them on, and grants her favours to one after the other as they approach her; after which each male will return to his own district. It appears also that not only does the male return year after year to the same locality, but the female though she wanders about in search of various lovers when pairing—seems to affect a particular district, where she deposits her eggs in the most suitable nests she can find." *

But, if certain of the males thus return to their own districts, it is out of the question that they can attend on and aid the hen in the guarding of the nest from the foster-parents when she is intruding her egg and doing whatever is needful to secure its acceptance.

* Dresser's Birds, *ad loc.*

IX.

HERE a very peculiar point arises regarding the migration of the young cuckoos from this country. Mr. Muirhead, in his *Birds of Berwickshire*, a truly good and beautiful book, says:

"It is not likely that the young instinctively know the route to be taken on migration, any more than a young, untrained homing pigeon knows the direction in which to fly to reach its cote, when it is conveyed a long distance away from its native haunt." *

And yet, in face of this, we know that the elder cuckoos quit this country in large numbers in the end of July, and certainly go in the earlier part of August, consistently with the old rhyme:

> "July, he may fly:
> August, go he must."

Mr. Muirhead himself, at another place, says that young cuckoos are common in Scotland till the end of August, and some have in different seasons been found there in the beginning of September. They certainly migrated, but the question is, if Mr. Muirhead is right, how?—if they had no intuitive notion of the route—how? The old ones had all long gone, and, if no intuitive notion of route—once again—*how?*

The following paragraph appeared in the *Daily Chronicle*, of Sep. 6th, 1898:

"THE CUCKOO IN SEPTEMBER.—The Rev. Selwyn C. Freer, High Ercall Vicarage, Wellington, Salop, writes, under date Sept. 1:—'It may interest some of your readers to know that a cuckoo was seen by

* i, p. 326.

myself to-day quite distinctly twice; the second time at a distance of not more than twenty yards. It must be rare that this early migrant is seen at so late a date in the year.'"

It raised so many questions and suggested so many problems that I am thankful I was led to write to Mr. Freer asking about it. In answer Mr. Freer was so good as to write to me as follows:

High Ercall Vicarage,
Wellington,
Salop.
September 8, 1898.

My dear Sir,

I was pleased to hear from you. I have long been familiar with your most interesting work on "German Life and Literature," and have read some of your contributions to the *Spectator*. I have talked with an old forester to-day a man of about the average intelligence, whose statements were quite decided, and I think may be relied on for their limited range. He said the cuckoo arrives here on April 16, generally, April 14 or 18 occasionally, sometimes a little later than April 18, if there is a cold stormy spring.

He said he had *certainly never* seen the old bird as late as September 1. That on two or three occasions he had seen the young cuckoo in October. Once, many years ago, when working in a distant part of this parish, he had seen a young cuckoo constantly which remained till "*nigh upo' Christmas*."

He said that it was the opinion of some men about here that the young birds did not leave at all, but he added that he had also heard some men "argy" that in the spring they "turned into throstles!"

Apart from this latter contribution to knowledge, may not there be something in the statement that the young cuckoo occasionally fails to migrate from this country?

May not the occasional very early appearance of the cuckoo (my brother saw one this year in Somerset in February) be

accounted for, *not* by an unusually early arrival, but by the fact that the supposed early visitor was a young bird who failed to migrate at all in the previous autumn, and who survived a mild winter in a sheltered neighbourhood ?

If this were so, it would seem to indicate a failure in instinct, or an incipient variety in instinct, not destined to establish itself under existing conditions, which would not be out of harmony with the apparently somewhat unstable, or at least variable, nature of the instinct of the cuckoo tribe.

I will try to find out anything more I can about the cuckoos here, where they are exceptionally numerous, so far as my observation goes.

If you can tell me of any point on which information would be desired, I will try to investigate it.

With sincere desire to be of any service that lies in my power.

I remain,

Yours faithfully,

S. C. FREER.

P.S.—May I add that if you are ever in Salop it would be a great pleasure to me if you could find your way to Ercall. I have nothing indeed in the ornithological line, but have some good American fossils, and a considerable collection of American Indian antiquities, embracing amongst them some rare stone implements, and other ethnological iota.

Mr. Freer's suggestion that some of the young cuckoos may wholly fail to migrate, is well worth consideration, and has led me to put together possibilities—in fact, to frame a kind of theory on the matter. We know that, though the cuckoo prefers for its eggs the nests of insectivorous birds, it nevertheless does occasionally—nay more frequently than is believed, drop its eggs into nests of seed or fruit-eating birds ; and that with their feeding the young cuckoos flourish equally well as with the strict insect diet—another remarkable fact. This would do some-

thing towards forming a taste for seed or fruit or berries, and in sheltered, protected corners, it is quite possible that a very late young cuckoo, or a cuckoo which had but imperfectly moulted the wing feathers might pull through, following in the footsteps of our own feathered residents.

In this, indeed, it would be but following closely the example of the meadow-pipit and some other birds it favours for foster parents, which, with nice adaptability, have recourse to seeds, berries and fruits in winter.

Even in the case of the accentor you have a bird whose staple in summer and autumn is insects, but in winter and spring it adopts an almost entirely seed or berry diet.

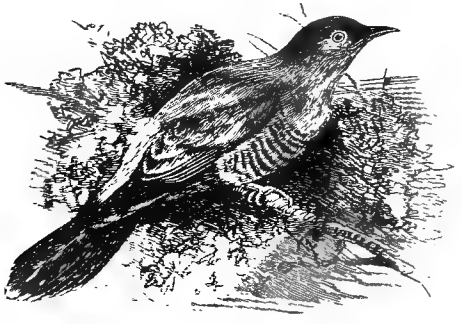
The observation of out-of-door people, like Mr. Freer's forester, of young cuckoos "nigh upo' Christmas" would be thus explained, and made, in fact, consistent with a general principle, viz., that cuckoos reared in nests of seed and berry eating birds, or, indeed, of insect eaters, that become seed eaters in winter might, more especially if imperfectly winged, without any very rude shock to a former experience in food, maintain themselves through the winter in mild situations and in mild seasons. Of course, this could not be the case with those bred of purely insectivorous birds—the whole of the available life in that line having been shut up. We read in the *Echo* of October 20, having missed the correspondence on which it is based, the following:

"Can the cuckoo be heard in October, as someone at Bodington, in Dorsetshire, has recently claimed to have heard it? A correspondent suggests that the

bird was a sparrow-hawk, a species that is sometimes mistaken for the cuckoo."

But in the case of a bird where the migratory instinct is so strong, and in any case where this instinct failed to act, some reason must be found in the exceptional physical condition of the bird which led it to brave the rigours of winter here instead of to attempt migration—some defect of wing feathers or power of flight. The food element is in all such questions a most important one.

This would account for what we are constantly hearing of the cries of cuckoos at dates so early that no ornithologist can believe that cuckoos had then returned from migration. Other cases there are analogous and at present wholly unexplained. There is, for example, that of the corncrake, or landrail, where, considering the defect of wing-strength, the persistent migration is wonderful, and the instinct to it is as powerful in view of its drawbacks as in any bird; yet in many districts landrails remain and skulk about here through the winter, and of this we know a case the year before last in Essex.



PART II.

FURTHER STRANGE TRAITS AND *SOME* DEFINITE RESULTS.

X.

Dr. Bowdler Sharpe tells a story which illustrates well one use of the imitative element in the cuckoo. The male bird is striped and barred in the breast and is in head and expression very hawk-like—an aspect he can emphasize by mode of flight, etc.

On one occasion a friend of his was desirous to observe a whinchat which was busy in the process of laying its eggs. The friend sat down in a protected corner and remained perfectly still and quiet, and what was his surprise very soon to see a female cuckoo come near and hide herself in the long grass. Then, in a very little time, the male cuckoo came and flew round and round, putting on his most hawk-like expression; the whinchats were frightened and flew off, the male cuckoo after them. This furnished a fine opportunity for the female cuckoo to deposit her egg in the nest of the whinchats which ere long returned, of course, to do the needful, foolish little simpletons, for the egg of the would-be hawk. Here is a case, said Dr. Bowdler Sharpe, where the resemblance of the male cuckoo to the hawk was clearly of use to it.

But more may be suggested by this than Dr. Bowdler Sharpe intends or foresaw. All this was scarcely needed, surely, to allow the hen-cuckoo to drop into the nest an egg with her bill—the work of a moment. But perhaps she had more to do. Mr. E. Blyth believed that the *canorus*, when she deposited her egg, did either destroy or turn out some of the legitimate eggs of the nest, and he goes on to say:

"From many experiments which I have tried, I

have found that, generally, in each case when a strange egg is put into a nest before the owner of it had begun to lay, that nest is *deserted*—if it be placed along with the owner's eggs, it is very commonly *ejected*, but if substituted for the latter, then the duped bird will lay other eggs to it and sit on all." *

I am inclined to think there is much more in this suggestion than has yet been realised. And my idea is, in so far, not theoretic, but practical: I have twice seen hen cuckoos flying away with shells or pieces of shells from nests—one that of a pied wagtail, and the other that of a robin redbreast, in each of which, certainly, there was found, on looking, a cuckoo's egg. The bird had broken an egg in the nest, sucked out the contents, and was carrying away the shell—just as a bird would do in the ordinary course after hatching, and as I have seen them do hundreds of times. My idea is that from observing this arose the idea that the cuckoos were egg-suckers, which, I believe, they are—but only now-a-days under the necessity of effecting the abstraction of an egg from the nest to make a place for their own egg, and so more perfectly dupe the victim. It is known now that the cock cuckoo habitually assumes his most hawk-like form, as Dr. Bowdler Sharpe by one case has illustrated, to drive away all birds from about the selected nest; this would be the more necessary if more were needed than merely to drop an egg in from the bill—the work only of an instant.

We have confirmatory evidence on this from a good authority:

"Some observers state that the hen cuckoo always

* *Asiatic Soc. Jrl.*, 1842, p. 4.

destroys one or more eggs of the foster-parent; but this seems only occasionally to be the case, and more frequently when her egg is placed in an open nest. . . . *It has also, with justice, been accused of devouring eggs, for my friend, Mr. Sachse, has seen one do so. Even after her egg has been deposited, she has been known to revisit the nest and destroy or throw out eggs or young birds, never, however, her own.*" *

With regard to contests of the cuckoos with victimized birds, Mr. R. Swinhoe, in his *Ornithology of Hongkong, Macao, and Canton*, thus describes one:

"One I was watching *(Cuculus orientalis)* flew off to another large tree, in which there was a magnal's nest, and close to the nest a brown bird, much like himself in form. The brown bird turned out to be the female, and set up a chattering noise on the arrival of her mate. She, very probably, had dropped, or had come to drop, an egg into the nest, for the magnal *(Gracupia nigricollis)* soon returned to the tree, and, seeing strangers so near his abode, charged them: the magnal, however, was defeated and driven off, and the cuckoos remained victorious." †

Mr. Swinhoe does not tell any more, which is unfortunate. Had he watched further, he might so far have decided the point whether with this species there was an attempt to destroy and take a magnal's egg from the nest.

Mr. J. H. Gurney quotes Mr. Norgate to this effect:

"June 4th, 1885. At about 3 p.m., my housemaid told me she had just put her head out of the window and saw a large slate-coloured bird, with a long tail,

* Dresser, v, *ad loc.*

† p. 46.

flying from a pied wagtail's nest, two or three feet below her face, on a pear tree on the wall, and that the bird had what looked like an egg in its bill, and two small brown birds were flying at it. Her attention was first called to it by hearing a great noise and fluttering. I at once climbed to the wagtail's nest and found one fresh cuckoo's egg and one wagtail's. I am quite certain that cuckoos usually abstract one or two (perhaps rarely more) of the foster-parents' eggs in exchange for their own."

A few years ago Colonel Butler found a greenfinch's nest in his garden in the north of Suffolk, with one egg in it, which he marked with a pencil. A day or two afterwards the nest contained a cuckoo's egg, and the marked greenfinch's egg was picked up on a path a considerable distance from the nest; almost certainly dropped there by the cuckoo.

Mr. J. H. Gurney also gives evidence sufficient to prove that *sometimes*, at least, the old birds do remove the true nestlings from the nest. This may be in certain cases where the young cuckoo for various reasons may have been unable to throw them out.

The late J. J. Briggs mentioned a circumstance which would indirectly tend to establish this, if we admit that, when the adult cuckoo throws the true nestlings out of the nest, it would also naturally, at the same time, try to guard its young from enemies.

The circumstance was this. When passing a certain point he saw a cuckoo strike down at his dog, and try to dodge or entice it away from a certain place. He found a young cuckoo was close by there in the nest of a hedge-sparrow. Dr. J. B. Gray tells us that he had seen a cuckoo, day after day, visiting

the spot where its offspring was being reared. Mr. Gurney also gives several cases where the eggs or young birds of the foster-parents were ejected from the nest on the very day on which the cuckoo was hatched, and therefore not able to have done the deed. He also cites the authority of a gardener, who, hidden in a pig sty, saw the old cuckoos carry off three young ones from a hedge-sparrow's nest. All this goes to show that, in favourable cases, the old cuckoos do the work themselves, thus assuring better feeding for their young ones from the very start. But this could not be invariably the case, simply because of the position of certain nests into which the cuckoo's eggs have been dropped, but from which it was impossible that the cuckoo could have entered far enough to extract even an egg for the one deposited, not to speak of abstracting young, without tearing and destroying the entrance of the nest; and this especially applies to the domed nests of wrens, and to some other nests.

Professor Newton quotes Rowley, *(Ibis* 1865, p. 286) to the effect that traces of violence and of a scuffle between the intruder and the owner of the nest at the time of introducing the egg often appear, whence we are led to suppose that the cuckow, ordinarily, when inserting her egg, excites the fury (already stimulated by her hawk-like appearance) of the owners of the nest, by turning out one or more of the eggs that may be already laid therein, and thus induces the dupe to brood all the more readily and more strongly what is left to her.* Mr. Rowley dwells merely on turning out the eggs: if so, we

* *Dictionary of Birds*, i, p. 121.

believe that that is alternative to sucking them and taking out the shells.

[Professor Newton uniformly spells the word cuckow—we follow in extracts from his writings.]

We do wish Professor Newton had in *Encyclopædia Brittanica* given a few references to such works, for example, as Mr. Blyth's "Monograph on the Cuckoo," in the *Asiatic Society Journal*, to Mr. Jerdon's section on Cuckoos in his *Birds of India*, and to such things as Captain Shelley's work on the Cuculidæ.

Mr. Emerson tells of several reliable fishermen in the Norfolk Broads, who affirmed to him solemnly that they had caught Mr. Cuckoo sucking duck's eggs, mavis's eggs, thrushes' eggs and even reed-bunting's eggs; and Mr. Emerson adds that, in cuckoo's crops he has found a yellowish substance that he can not but regard as egg, and adds, "I believe cuckoos do suck eggs as do most predatory birds." *

On another page, Mr. Emerson says, "though I never caught him in the act, I have found eggs sucked that were whole before the cuckoo hopped about them.† . . . . The marshmen say they often hear the cuckoo talking to the titlarks and sedge-warblers, the birds answering them, and then, they say, they are on the look-out to suck their eggs and lay their own in the nest."

Mr. J. H. Gurney cites the evidence of Mr. H. L. Wilson who, in the spring of 1880, at Powick, near Worcester, took the remains of eggs out of a cuckoo's crop, judged to be robins' and hedge-sparrows'.

Mr. Wilson wrote in the *Field*, January 28, 1882:

* *Birds of the Norfolk Broadland*, p. 162.

† *Birds of the Norfolk Broadland*, p. 163.

"On skinning it (the cuckoo) I found its crop was full of a mash of eggshells. I carefully examined this mash and succeeded in separating the broken shells (held together partly by the inside skin) of at least seven eggs, two of which were robins, and the rest either hedge sparrows' or thrushes', or some bluish eggs."

And Mr. Gurney avows himself a believer in occasional egg-eating cuckoos.

The great spotted cuckoos also eat eggs, as shells have over and over again been found in their stomach.*

Thus we reach some definite results. The cuckoo destroys *some* of the eggs of the birds in whose nests it places its own—sometimes it sucks them in the nest, and carries out the shell in its beak: sometimes it eats part of the shell and carries out the rest; sometimes it eats the egg absolutely, shell and all.

Another point: It would perhaps be rather strange to the foster-birds if the young cuckoo had anything like his true cuckoo feathers at first, which would be something very different in aspect from that of their own true progeny. But the young cuckoo does not get his true feathers till before migration; and so long as he remains in the foster-parents' nest or under their protection, his feathers are dull and dark, almost black—another very peculiar point about the bird.

And these distinguishing marks in plumage maintain themselves, though not to the same extent, entirely through the first season. Lord Lilford wrote:

"The difference of plumage between adults and birds of the year is so singular and noticeable that more than one writer on ornithology has treated of

* *Ibis*, 1862, p. 358.

the latter as a distinct species; for this reason, and because the adult has been more frequently figured than the young bird, I have given the prominent place on the plate to a bird of the year. The young of the cuckoo differs much in plumage from the old bird, being dove-brown, barred with reddish brown."

Here is the report of another observer:

"During the pairing time, the cuckoo acts in a very headstrong, jealous, and wild manner. He gets into a dreadful rage when another of the same species dares to invade his territory. And yet he is a Simple Simon all the while. He will come blindly to the call of the sportsman, who understands how to imitate his note. Sitting on a branch, with raised tail and ruffled head-feathers, he cries 'cuckoo' as if in defiance to all the world—of birds, at any rate.

"While flying he will often glide slowly in front of his mate and tell his passion with a low 'crawawa,' to which the latter answers, 'kwikurkurk,' etc., with great rapidity, a cry savouring more of laughter, or a chuckle, than a favourable response to his affectionate invitation. When both are at the height of their courtship, the one cries 'cuckookook cuckookook,' while the other laughs and chuckles. After the breeding season is over, both sexes are silent. It is possible that in many cases the cuckoo is content with one mate; yet, the males being in excess, this is hardly possible either; and that each male should in turn court all the females alike, which might in certain cases justify this unbounded jealousy."

The call of the cuckoo, it may be added, is a true song, that is, a music made for the mate, and the changes it undergoes in the season are only further

proof of this. As to jealousy of the male, that is explained by later observation already referred to that hens are in the minority, and the rule must be not *polygamy*, but polyandry.

The Rev. Charles Alfred Smith, in the *Zoologist* for April, 1873, threw great doubt on the point whether the young cuckoo does invariably throw the birds of the foster-parents out of the nest, and he also raised questions on other points. As he wrote from personal observation in every case, his remarks may claim regard. Though he did not dispute the facts of the young of the foster-parents being thrown out of the nest, he endeavoured to cast the blame for this on the elder cuckoos, and quoted foreign observers, though it needs always to be remembered that foreign families of cuckoos may, in quite different circumstances, act quite differently from what ours do, as indeed the American cuckoos are, in several points, very different. In confirmation of his own views, he cited the experience of Dr. Dybowski, given in the *Journal für Ornithologie*, to the following effect:

"With the theory that the newly-hatched cuckoo turns the young of its foster-mother, either mechanically or involuntarily, out of the nest, I cannot declare myself to coincide, since I have facts to produce which tend to quite different conclusions. For we found in an uninhabited valley near the river Alengui, in Dauria, a nest of *Anthus ricardi*. It was inserted in a depression at the foot of a rather large heap of earth, whose surface up above projected over the nest on all sides to a considerable extent. In this nest there was only a young, still quite unfledged

cuckoo, and not more than from two or three days could have elapsed since it had crept forth from the the egg.

"Not far from the nest two young pipits were lying, which were certainly still alive, though extremely feeble; and, a little further off, a similar young bird, already dead. As we took the little birds in our *hands, it was apparent that their crops were full, and their stomachs also well filled.* Nevertheless, the poor things were so exceedingly cold that they gave hardly any distinguishable signs of life.

"Now the question arises, what could be the reason of this (at all events, to say the least of it,) involuntary abiding of the above-named young birds outside their nest? The young cuckoo certainly could not have caused it, as he was still much too young for such a task; the young pipits themselves could not have got out of the nest, because it lay much too deep down for them to have done so. There remains only the theory that the parents (either those of the pipits, or those of the cuckoo) must have done the deed. Of the pipits, there can surely be no question; indeed, in my opinion, in the case before us, one can lay the blame solely and entirely on the cuckoo, and, indeed, on the female bird.

"Again: not far from Darasun, where several cuckoos had been killed a short time before, we found, in the month of June, in a nest with a young cuckoo, a young pipit, nearly full grown. The young cuckoo could not yet leave the nest, nor did he even know how to make his escape out of it, to get away from us; so he sat still in his place, and hissed at us; whilst the young pipit could already run, and was

just preparing to slip out of the nest away from us. In this case it must be assumed that there was none near at the proper time who could cast out the young pipit.

"Again: in one and the same nest we found two cuckoo's eggs, the colouring of which entirely differed, the one from the other.

"Again: in a nest of *Phyllopneuste fuscata* we found a cuckoo's egg, green-speckled black, like that of *Uragus sibiricus*, which (as is well known) will not receive the egg of the cuckoo, but will rather destroy the nest, and remove its materials; but near the aforesaid nest lay the eggs of the *Phyllopneuste*, of a pure white colour.

"Again: we often found damaged nests, some even torn asunder; the eggs of which were not eaten, for they for the most part lay around, at a little distance from the nests, broken.

"The above facts, as well as many other cases, cause us to express the following opinions upon the cuckoo:

"(*a*). The female cuckoo deposits her eggs in the nests of other birds; she does not cast out the eggs of those birds intentionally, and *if this should sometimes happen it ought to be considered as done by accident.* [This is a big assumption, and must be felt to be so, when we have in view what has been said on the subject of substitution of eggs.]

"(*b*). Every female cuckoo has her own district, and certain chosen nests, in which to lay her eggs. If she sees that another female cuckoo comes near this district, then she pursues it, and drives it away: but if the other female cuckoo is able to slip into

such a district without being seen, then it may well come to pass that two cuckoo's eggs may be laid in one and the same nest.

"(*c*). With the spoiling of the nests and the scattering of the eggs we must not charge the female, but in every case the male cuckoos, which probably adopt these means to force their mates to a prolongation of the pairing time. (Verlangerung der Paarungszeit.)

"(*d*). After hatching, the female cuckoo turns the young of her nurse out of the nest, in order to secure a more certain existence for her own offspring."

It should be noted that at this time the reports of observations of Mrs. Blackburn and Mr. Hancock were not yet published, or, at all events, well known; and, it should be emphatically repeated, that cuckoos in different climates and latitudes may and do act quite differently; though with these commentaries, Mr. C. Smith's carefully observed facts and his inferences, as well as the facts cited from Dr. Dybowski, may well be modified and fall into range exactly.

A writer in *Science Gossip* a short time ago raised an important question in the following passage:

"I was one evening, about seven o'clock (it was almost midsummer) searching for the nest of a grasshopper warbler, whose note I had heard in a certain field on several successive evenings. While thus engaged, I saw a cuckoo, followed by a grey wagtail, flying over a neighbouring wood. After a few minutes the wagtail returned, and I went in that direction, but failed to find her nest. On the following evening I was again engaged seeking the grasshopper warbler's nest, and I again saw the cuckoo pursued by the wagtail.

"Once more I sought for the wagtail's nest, and again failed. I would fain ascertain for a fact whether or not the custom of the cuckoo is to visit its eggs and young periodically, and if so, how often.

"I knew that it was said the physical conformation of the cuckoo incapacitates it from the work of incubation, and that, consequently, its maternal instinct teaches it to deposit its eggs to be hatched in the nest of other birds. According to my idea, it would seem a painful blot on the cuckoo if it did not feel anxious for the welfare of its young, and manifest its watchfulness and care by frequent visits. I would much rather believe that the cuckoo pays daily visits to its eggs and young; and when they are all fledged, gathers them, though reared in different homes, into one family, and then takes them, under its fostering care, to distant lands."

This we know well now the cuckoo does not do. When this observer wrote it was not so well established as it is now that the parent cuckoos migrate weeks before the young birds—mainly, no doubt, because of facts connected with moulting.

We have seen that Mr. J. E. Gray is firm in his conviction, based on observations of his own, that the cuckoo does not uniformly desert her offspring, but on the contrary, continues in the precincts where the eggs are deposited, and, in all probability, takes the young under her protection when they are sufficiently fledged to leave the nest. If, however, the cuckoo lays four or five eggs, or even more, this would be difficult—far more difficult than with some of the foreign varieties, which lay the whole lot in one nest.

From the evidence of close observers and expert

ornithologists like Mr. Hancock and Mr. R. P. Harper, there is some ground for thinking that the young cuckoos when they take the wing are sometimes fed by the old ones. Whether each young one is recognised by its own true parents, or whether the attention is merely one of kind to kind is a question on which at present no decisive judgment can be given, as there is really no data to justify such a decision one way or another.

A very keen discussion on the habits of the cuckoo took place in the *Zoologist* for 1873, in the course of which Mr. G. B. Corbin wrote:

"As a lover and student of the feathered tribes, I may be allowed to offer my small item of experience with regard to the above question. The two nests in which I have most frequently found a cuckoo's egg are the hedge-sparrow and meadow-pipit, more commonly the latter. I have at different times taken scores of nests of the red-backed shrike, but on no occasion have I found a cuckoo's egg in them; neither have I ever seen a cuckoo's egg bearing the least approach to the blue of the eggs of the hedge-sparrow and redstart.

"Some two or three seasons ago I noticed that whenever I passed along a particular hedge-bank in the meadows, a cuckoo was always to be seen somewhere in its vicinity, so I concluded that an egg had been deposited not far off. I searched the herbage very closely, and at last found what had been so attractive to this summer-loving bird, viz., a nest of the blackheaded-bunting, containing a cuckoo's egg and five of the rightful owner's. Four of the bunting's eggs were of the usual colour and markings, but the

other was white, with a single small dark spot upon it. As they lay in the nest, I thought they were rather a motley group. On another occasion I found a meadow-pipit's nest, containing six of its own eggs and one of the cuckoo. My limited experience would point to the fact that cuckoo's eggs are less variable than many other species as to colour and marking, *unless indeed their colour is so variable that they are often confounded with the species amongst which they are laid*,* for, as a birds'-nesting schoolboy, I was often surprised at the abundance of the cuckoos compared with the number of their eggs found in a season; and provided each female lays more than one egg, which, I believe, is the case, the proportion seems still greater, as the birds always appeared to be ten to one against the eggs. Probably an unskilful way of finding the egg is the chief cause of such apparent disparity, but I have noticed that the parent cuckoo generally loiters about the spot where her egg is deposited, unless she has a circuit—spots in which she visits at intervals—and thus becomes a kind of overseer of her scattered brood. I never found more than one cuckoo's egg in the same nest, nor is it often that nests containing a cuckoo's egg are placed very near to each other.

"*Why* do we often see small birds mobbing a cuckoo? Is it love or fear that prompts the performance, as these smaller birds in like manner tease rooks and hawks? That the cuckoo introduces her

* A thing rendered probable by Mr. Corbin's never having met with a blue cuckoo's egg. It does, indeed, require a quick eye to detect it among those of the hedge-sparrow, as, not seldom, they differ only a little in size.

egg into the nest with her bill is, I think, unquestionable, as the pipit's nest before adverted to was in such a situation, under a large tuft of heather, that no cuckoo could possibly have laid in it, and I found the nest by the mere chance of seeing the pipit come out, after nearly treading upon it."

I have given these records mainly because the writers in certain respects proceed without prepossession, and may influence later writers, and when thus regarded their observations are the more valuable when we adjust and set them in line.

It is proved by my own experience, as well as that of several others, that two cuckoos' eggs are sometimes to be found in one nest: sometimes more nearly like each other, sometimes very different. Here, on this point, is the experience of a correspondent of *The Field*, under date June, 1894:

"*Two cuckoos' eggs in one nest.*—While strolling over Ashtead Common, in Surrey, Saturday, I noticed a hedge-sparrow dart hurriedly out of a gorse bush a few feet away, and on looking into the bush I found her nest, which contained three of her own eggs, and two of those of the cuckoo. I believe it a rare occurrence to find two eggs of this bird in the same nest. The eggs were totally unlike each other; one being much larger and of a lighter colour, while both were slightly set. This locality seems to be a favourite resort of this bird, for on the same afternoon I heard at least a dozen different cuckoos calling from various directions at the same time.—W. R. Pope."

And to this the Editor of *The Field* himself gave the following note:

"In the chapter on the cuckoo in *Our Summer Migrants*, it is remarked (p. 230) that two cuckoos' eggs of a different colour have been found in the same nest. If both were laid by one bird, then we have proof that the same cuckoo does not always lay eggs of the same colour; if laid by different birds, then the cuckoo is not so impressionable as has been supposed. The full bearing of these remarks will be better understood by referring to the context, which is too long to be here quoted." *

* *Field*, June 2, 1894.

PART III.

MR. DARWIN AND MR. ROMANES DEALT WITH.

XI.

MR. DARWIN found the cuckoo one of the most difficult creatures he had to tackle—to explain and to reconcile the phenomena it presents with his theories of evolution and natural selection. In fact, the great master there just wrote a little nonsense, and, though

> "a little nonsense now and then is relished by the wisest men,"

we could not relish it from Darwin, who had as little of fun about him as he had, as he himself confessed, of poetry. He wrote, in the remarkable 8th chapter of the *Origin of Species*, 6th edition, as follows:

"It is now commonly admitted that the more immediate cause of the cuckoo's instinct is that she lays her eggs, not daily, but at intervals of two or three days, so that if she were to make her own nest, and sit upon her own eggs, those first laid would have to be left for some time unincubated, or *there would be eggs and young birds of different ages in the same nest.* If this were the case, the process of laying and hatching might be inconveniently long, more especially as she has to migrate at a very early period, and the first hatched young would *probably have to be fed by the male alone.*" (Italics in the two places are mine.)

In answer to this proposition it has been very well written:

"Might it not just as reasonably be said that the parasitic instinct is the more immediate and final cause of her laying her eggs at long intervals?"

And Mr. Darwin thus proceeds:

"Let us suppose that the ancient progenitor of our European cuckoo had the habits of the American cuckoo, and that she occasionally laid an egg in another bird's nest. If the old bird profited by this *occasional habit* through being enabled to migrate earlier or through any other cause; or if the young were made more vigorous by advantage taken of the *mistaken instinct* of another species than when reared by their own mother, encumbered, as she could hardly fail to be, by having eggs and young of different ages at the same time, then the old birds or the fostered young would gain an advantage. And analogy would lead us to believe that the young thus reared *would be apt* to follow, by inheritance, the occasional and aberrant habit of their mother, and in their turn *would be apt* to lay their eggs in other birds' nests, and thus be more successful in rearing their young. By a continued process of this nature, I believe that the strange instinct of our cuckoo has been generated." (pp. 212-213.)

By the way, so many "may be's" and "would be apts" do not seem to us quite so scientific as might be. Again specially note the words I have put in italics.

Mistaken instinct! How can an instinct, in the sense here too obviously meant, be mistaken? It is, in view of its own intention, unerring, a fact which Dr. A. Russel Wallace has duly recognised, and has to fall back on failure of reasoning power. Either this or the word "instinct" has really no proper meaning. To nurse and feed an intruded alien to the detriment of the creature's own young is surely against instinct, and is to be accounted for by some-

thing else. But "mistaken instinct" is a contradiction in terms under any true definition of instinct that we can think of. *Mistaken* here only means lack of instinct and failure of reason which is not able to make up for its absence. Yet we have cases of Birds, as, for example, the reed-warbler we have told of, that twice, not being able to turn out the intruded eggs, built them over and removed them from the influence of the heat of its own body necessary to hatch them. Here, surely, instinct and reason worked together to one end: not so in the cases Mr. Darwin includes under "mistaken instinct."

To Von Hartmann's definition of instinct, that it is action taken in pursuance of an end, but without conscious perception of what the "end is," Mr. Romanes supplies the rider, that it is the uniformity of instinctive action as performed by different individuals of the same species. As in all such cases of definition, you find assumptions contradicted by what are meant to be qualifying clauses. Thus, even Von Hartmann's "action taken in pursuance of an end" is reason which he thus maladroitly qualifies by "without conscious perception of what the end is." But how can an end be pursued without more or less conscious seeing what it is? And Mr. Romanes then comes in with a rider, in regard to which we would ask, is the tendency of the members of the cuckoo tribe to incubate an instinct, or is it not? And in that case, what is it, seeing that his "uniformity" of instinctive action, as performed by different individuals of the same species, will not here hold? And all this points to a more general question still. How are these gentlemen to define strictly and consistently these

"occasional habits," out of which Mr. Darwin—to us rather illogically, and surely inadvertently—says that instincts are developed with co-operation—be it noted—of time and chance. Are these "occasional habits" instincts, or what are they? If they are got purely out of occasional habits; then certainly your effect is greater than your cause, and so far outside it. And at what point, pray, does the "occasional habit" become an instinct?

XII.

THERE is no such absolute uniformity in the case of other birds, as against the cuckoo, in hatching eggs simultaneously, as Mr. Darwin founds on here. Indeed, there is no such thing as *absolutely* simultaneous hatching of eggs. It would be very trying and troublesome to the female bird, if it were so: for she has a duty to the shell—to clear it away; and a duty to the young bird—to dry and clean it. And, transparently, it would be disadvantageous, if, while she dried and cleaned one—three, four, five, six, or even seven others were lying wet and cold, waiting her attentions. I say then, firstly, and from observations alike of tame birds—canaries, linnets, and others bred by me—and of wild birds, that, to a greater or lesser degree, birds of different ages are invariably in the same nest, and the first hatched young are in the multitude of cases fed by the male alone, or by the female receiving the food from the male and really giving it to the young without leaving the nest—the wonderful accommodation of the digestive organs during incubation enabling her to do this for long,

long periods without more than rising from the nest, to stand on the edge of it. Why, in my own case I have had birds that slipped till the second and even, once, till the third day between the eggs in laying, and the youngest of the brood was nigh three days younger than the next to it, and seven days younger than the eldest of the brood. And in this lies, indeed, a great aid to the parent birds in the feeding—most anxious time when the young birds scarce can fly steady and yet will leave the nest — in that when the first fledged birds will go out, the younger one or two will still lie contentedly in the nest, dividing the attention needed and lessening the care and labour. But for this arrangement very few birds could survive. I have over and over again seen two and even three eggs almost or partially covered by the birds only a day or two from the eggs—the warmth of their little bodies no doubt assisting the female greatly in hatching them. Every sitting bird, as the eggs are hatched, brings out in her bill, as with a kind of triumph, the pieces of the egg-shell, which most carefully she carries to some distance (cunning thing!) before she drops them, as, if she merely threw them out of the nest, they might to some enemies mark clearly her nesting place. My birds uniformly carried the pieces of the shell to the farthest corners of the room and there, after a moment or two, dropped them—never near the cages in which the nests were —and this in the cases of canaries and other birds. It would not do for all the eggs to hatch absolutely at once were it for nothing more than this (to some, perhaps, apparently rather unimportant reason),

which, however, it is not. It would take the female too long from the nest at once to carry out ten or a dozen pieces of egg-shell. Some birds come *much* nearer to simultaneous hatching than others; but, simultaneous hatching in the absolute sense is not existent.

Why, Mr. James S. Gould, in *My Canary Book*, following Buffon and Bechstein, writes:

"All you need to do is, when the nest is finished, to open the side door of the nest-box quietly, and ascertain when the first egg is laid. *Do not touch it on any account.* Never use *ivory eggs*, one by one, to replace the eggs until they are all laid. Let Nature alone. The birds ought not to be all hatched at one time."

And Buffon long ago gave the reason: "The plan of removing the eggs so as to have them all hatched at once is unnatural and bad because it causes the mother a greater loss of heat, and burdens her at once with five or six little ones, which coming together disturb rather than please her; whilst in seeing them hatched successively one after the other her pleasure is increased and her strength and courage better supported."

And this, even in cases where the male assists the female in brooding. Again, in a large number of cases, it is very well known how strict the cock is in hunting the hen back to the nest, and this more especially after the first of the eggs have been hatched, as though the very sight of the breathing living things added greatly to his jealousy of the nest and watchful care of it.

As regards intervals between layings, several of

the owls lay their eggs at intervals quite as long as the cuckoo, or even longer than the cuckoo, according to Darwin, and the owlets first hatched help to hatch the other eggs. This indeed is done, as just said, in all cases of birds more or less. Further, the cuckoo's stay in this country is no briefer than that of some of the swallows or the exquisite little garden-warbler, yet the swallows and the garden-warbler contrive easily to bring off a brood and sometimes even two broods. Thus (and there are yet other arguments which would take us into too technical matters) Mr. Darwin's explanations are not well based, in some points seem even ignorant, and in certain respects explain nothing but his own limitedness and utter lack of power to grasp the difficulties that he perceives and wrongly fancies that he at least partially meets and explains away. The difficulties remain after all his efforts have been made.

Further, we may make bold to ask, what is so very out of the way in expecting this of the cuckoo, when the blackcap, which comes later than the cuckoo, and has a nest to build and courting besides to do, in which he is indeed a proficient, has eggs in the earlier half of May? Dr. Bowdler Sharpe says that he has found hard-set eggs of the blackcap as early as the 12th of May." *

Even the night-jar, with but two eggs, does not *for this reason* hatch them both *absolutely at once*. We have found the little young one for all the world like a tuft of fur torn from a rabbit's breast, and left almost imperceptibly wavering there in a slight gust of wind beside the other egg; and this is true also

* Allen's *Handbook of Birds, ad loc.*

of the American species as told us by Nuttall and Burroughs, and by Thoreau, whose wonderfully-graphic description may here be given :

" There was one egg still, and by the side of it a little pinch of down fluttered out and was not observed at first. More than a foot down the hill had rolled *half* the shell it had come out of."

Where, I would ask, was the other half ? Thoreau's eye would not have missed it had it been there. May be the mother had just then gone off with it thirty or forty yards at least and had not got back for the second half when Thoreau came along too near. The inside of the egg, you see, was not protectively coloured like the outside, and would have told her secret too clearly. That mother night-jar or night-hawk would not forget that—believe me !

" There was no callowness as in the young of most birds," Thoreau goes on. " It seemed a singular place for a young bird to begin its life, this little pinch of down, and lie still on the exact spot where the egg lay—a flat, exposed shelf on the side of a bare hill, with nothing but the whole heavens, the broad universe above it, to brood it when its mother was away."

But she was not far away, nor would be away for long. The second half of the egg shell would go after the next short sitting on the egg to keep it warm.

XIII.

DARWIN himself well points out that "it is surprising instinct should lead small nesting birds to remove their broken eggs—(it should surely have been egg *shells*)—and the early mutings; whereas with partridges, the young of which immediately follow their parents, the broken eggs—(it should surely have been egg shells), are left round the nest." More often they are left in it, or a portion of them. The protection of the partridge, which nests on the ground, or very close to it, lies in the power of her brood to run, if disturbed, even on being hatched; the partridge at once leading the young ones to protective holes, and under cover of hedge bottoms, etc., so that the removal of broken egg shells is not particularly necessary, considering other protective points; but it is of importance—of the utmost importance—to nestlings which are unfledged and cannot move from the nest for many days: and I think it one of the most extraordinary things that Mr. Darwin never seems to have in the least connected this remarkable fact with the necessity, in the small birds, of non-simultaneity of hatching.*

Major Bendire has this passage in one of his able articles: "It is said" *(Origin of Species*, chap. viii), "that the American cuckoo lays at long intervals, and has eggs and young at the same time in its nest, a circumstance manifestly disadvantageous. Of the *Coccyzus melanocoryphus*, I can say that it never begins to incubate till the full complement of eggs

* Romanes' *Mental Evolution*, appendix, p. 379.

are laid; that its young are hatched simultaneously. But if it is right to trace the origin of the European cuckoo's instinct in the nesting habits of the American coccyzus, it might be attributed, not to the aberrant habit of perhaps a single species, but to another more disadvantageous habit common to the entire genus—their habit of building exceedingly frail platform nests, from which the eggs and young very frequently fall." *

Major Bendire's remark about simultaneity of young hatched—if we admit the correctness of his observation—is not conclusive against our position, nor does it really touch it. What we hold is, that absolute simultaneity does not exist in any strict sense; that in any case there is only the more or less close approach to it. Eggs vary in size, in thickness of shell, etc., just as much as to provide the margin we claim. Besides, Major Bendire here founds, not on one of the more common species, but on one which he does not even treat of—at all events, under this name—in his Smithsonian volume, where he distinctly says of the yellow-billed cuckoo, that as to incubation there is no absolute rule. Sometimes it does not begin till laying is done, and in other cases incubation is begun when the first egg is laid.† But the Major's argument against Darwin is conclusive.

Further still, with regard to intervals between the laying of eggs, there is in no species whatever the uniformity which Mr. Darwin seems to found on here. Sudden frost and cold will completely stop egg laying. Once in the case of starlings, which I could observe

* *Smithson Report*, 1893, p. 610.

† p. 23.

from a dormer attic window, four days, owing to cold and frost passed between the third and the fourth; and Mr. Robert Read, a most reliable authority, assures us that he once found a blackbird's nest at Blackheath, very early in the spring, in which the bird had laid a single egg. A spell of frost and snow supervened, and no more eggs were deposited for a fortnight, when mild weather once more set in and two more eggs were laid precisely similar to the first and evidently by the same bird. There are certain general rules about this point connected with species of birds, but the exceptions are the most interesting in all cases to observe and study; leading to the idea of resource, adaptation and contrivances manifold, so that there is in no case the absolutely assured uniformity Mr. Darwin assumes. All this Mr. Darwin would on his principle here, in ornithology, wipe out —a strange thing for him to do: for here, in this very bird, we have, perhaps, the most remarkable hints of his own favourite evolution and natural selection! Truly the race is not always to the swift, nor the battle to the strong, nor even the power in the case of great observers to see the point. This much in our own favour.

Mr. Darwin in the sixth edition of the *Origin of Species* also, rather maladroitly says:

"I have lately heard from Dr. Merrell, of Iowa, that he once found in Illinois a young cuckoo together with a young jay in the nest of a blue jay (*Garrulus cristatus*); and as both were nearly fully feathered, there could be no mistake in their identification."

Here the fact of the two young birds of different species together has a significance as to differentiation at which he does not even glance.

Indeed, from my own observations, in conjunction with those of Mr. Hancock, as given respecting the young cuckoo turning out its foster-brothers from the nest, I am convinced that the non-simultaneity of hatching is one of the circumstances that tend to give the young cuckoo much of his power: he has a chance at once against eggs and young ones, and it is clear that he is keen to work upon both, so long as is necessary, by his restlessness, making it impossible for the foster-bird to hatch out the second half of the eggs, which he inclines first of all to dispose of, as was notably the case in regard to the nest observed by Mr. Hancock. Absolute simultaneity of hatching, that is, practically, four young birds at one moment to deal with, in place of one or two, would present difficulties—at least the business would be, on all natural considerations, rendered longer, more hazardous and hard.

One fact, which was not only before Mr. Darwin, but specially dwelt on by him, might have led him to revise his whole passage relative to the cuckoo in eighth chapter of *Origin of Species* had he been anything of a thinker, which he was not. This fact was the stay of young cuckoos in our country up to the month of September. It might surely have struck Mr. Darwin that if the young ones could stay, the old ones surely could. It did not strike him to ask any question in connection with that, therefore we say he was not a thinker. It seems to have struck another writer with great force:

"The cuckoo's early migration can hardly be part of the cause, it is rather a correlated effect. The cuckoo leaves us early because its parental instincts

or duties are not strong enough to detain it. The young cuckoos do themselves remain until comparatively late in the year (September), or until they are strong enough to undertake their flight. What cuckoos of the first year could do, the same birds in their second and subsequent years could surely do also." *

If the adult cuckoos leave this country because of the failure of food supply—it being said often that they leave this country just when the majority of the summer caterpillars assume the imago stage — the question may well be asked, how do the young birds fare when the larger supply of their natural food is cut off? Is there a provision in this case for making up for this defect by adapting themselves to other food; and if they do so, why cannot the adults do the same? This question is, indeed, a very suggestive one—that the young cuckoo's foster-feeding has prepared it for this adaptability, whereas that of the adult has not; but then there is the further consideration and question: why is this adaptability limited only to birds of the year, and why should they in such a matter linger so long behind the old birds; and, more than all this, why, when they stay in our country so late as end of September and even into October, they should go at all on such a long and perilous journey over lines they have never traced before, when they can adapt themselves to what is properly winter-feeding, and when in various portions of the country there are mild and protected portions, where the cold could not injure them if fair supplies of food were to be had?

* Dr. Creighton's *Jenner and Vaccination*, p. 14.

Mr. Darwin, in the first portion of passage noted, does no more than merely condense the remarks and reasonings of Jenner; and in a matter so very exceptional and peculiar we really should have expected something very different from him. For it is all too clear that Jenner, having got, as he fancied, on to a "good thing," could not refrain from endeavouring to go one better than the facts, and to explain them conformably with a foregone theory. Mr. Darwin was cute enough in dealing with that same tendency sometimes, and severe enough in condemning it; so that here indeed we find something to wonder at in his very meek acceptance of all that Jenner said. To gain his end, Jenner, after laying it down that the adult cuckoos—coming about the middle of April—do not lay until about the middle of May, certainly gives full time for accidents; for, as the bird builds no nest, what has it got to wait a month for before beginning the main business for which it came here? Mr. and Mrs. Cuckoo are too much "persons of business" for that! Cuckoos' eggs have in many years been found in nests in the very beginning of May. It is then, indeed, that the hedge-sparrow is most imposed upon; which may well have led to the idea that it is more often the victim than it really is; whereas the meadow-pipits, pied fly-catchers, the wagtails, the warblers and wrens are most duped afterwards. Another and very good reason for this is that the hedge-sparrow, (*Accentor modularis*) is one of the very earliest builders—its nest being found finished often as early as March. It is laying eggs often in that month, and, therefore, the cuckoo loses the chance of depositing among the first clutch.

But the second is what in many cases will come just to suit it about the beginning of May. Jenner would give the cuckoo a fortnight for sitting and hatching the eggs, and three weeks in nest for young ones before they fly, and then he would give the young cuckoos five or six weeks to be fed after they fly. And he asserts that the cuckoos quit this country in the first week of July; which is not correct—they go later, often not till August—verifying the old saw:

> "July, he may fly,
> August, go he must."

Dr. Bowdler Sharpe is much nearer the mark when he says ("Birds," Allen's *Naturalist's Library* ii, p. 25), "leaving about the end of July;" for adult cuckoos in sheltered situations in mild seasons are often seen in the earlier days of August.

By this kind of process you could prove or establish anything; but Jenner, though he was so far right in his observations, got wrong the moment he took up a theory as other clever men have done, and was determined to make *everything* bend to his plausible explanations.

Though it is true, as Cuvier says, that the young cuckoos are "exceedingly slow in learning to take their own food," yet, *five or six weeks*, taken up in feeding the young cuckoos after they fly is too much, you would by that have such a disturbance of the breeding process in all victimised birds as would indeed be very marked and revolutionising. Sparrows, pipits and others which have three and sometimes four broods a year would have only one brood or at most two; and the long drawn out periods of feeding

the flying cuckoos would cause such a complete departure from the instinct towards a new brood that I for one believe that the young cuckoos would after all be left to their fate. For this instinct is one of the most imperative of all instincts; and I do not believe that in such circumstances the motive would be strong enough to cause it to be so absolutely departed from in this special case. Eckermann, in talking with Goethe, saw this, but scarcely realised the whole result of what he allowed in his own mind.

There is, besides the best reasons for believing that in cases—very rare cases, when the cuckoo itself broods its young, the young can forage for themselves in three weeks, while, under care of the foster-parents, they need five or six weeks. This is a point that I do not remember having seen any attempt whatever to explain; yet it is so peculiar that it demands investigation.

Then, in view of the propagation of species and the securing of the desired end by the most direct possible process, does it not seem a sad defect in nature's contrivance that she has not made the young cuckoos quick and ready to learn how to find their own food. The chicks of the mound-building birds, after having forced their way through some feet of mould and dust, run into the thick forest and can at once provide for themselves. This seems all right under the ordinary rule of natural selection and survival of the fittest; but if these laws are here illustrated by the chicks from the mounds, they certainly are not so, in the extraordinary time the young cuckoos remain practically helpless, dependent on others absolutely, when they should be self-supporting.

And, notwithstanding the extraordinary reputation accorded to Mr. Darwin, for patient observation and persistence, and his independence of all authority, here we find him, implicitly followed, too, by Mr. Romanes, most meekly accepting Jenner's endeavours to force the facts to fit his theory; and neither one nor the other of our great geniuses of evolution think for a moment of waiting a year or two, and quietly going to look for themselves. No, they prefer to accept Jenner's version, and to theorise, and dogmatise, and say "it may be," and "probably it was," etc., etc., instead of using their much vaunted observing faculties, and just for a little while going to look and see for themselves.

Just compare all this Jennerised theory and argument about the cuckoo, both on Mr. Darwin's and Mr. Romanes' parts, with the excellent result of observations close and careful of Mr. Romanes and his sister on the *Cebus*, in *Animal Intelligence*, pp. 484—498, where due and careful observation of the creature was directly and patiently made; though, of course, one disadvantage is still involved in observation under such circumstances, that the creature is isolated and in artificial conditions. But you cannot bring a cuckoo into your house, and get it to live with you, as you *can* do with the *Cebus*, and therein lies the mighty difference,—just as certain deer the artist can get into his studio, and can there paint from them; but others, that he sometimes very much wants to paint, he cannot get brought to him in this way, and hence some of the most notable blunders.*

* See Lord Southesk's *Britain's Art Paradise*, which contains a list of some natural history errors in Academy exhibitions.

XIV.

If slight change of external conditions could have such effects as Mr. Darwin has described in chap. xii, *Domestication*, in the case of the Aylesbury Ducks, which in a different part of England lost their habit of early laying, to lay exactly at the same time as the common ducks do there, does this not suggest that more weight should be laid on possible changes in external conditions in wild birds and other wild creatures, and certain possibilities of birds of different families, if not of different species, under similar conditions, coming to act similarly even under very unexpected lines?

Mr. Darwin's own argument, at p. 43, vol. ii, of *Domestication*, surely in full force applies here. He says:

"There are some breeds of fowls which are called 'Everlasting layers,' because they have lost the instinct of incubation; and so rare is it for them to incubate that I have seen notices published in works on poultry, when hens of such breeds have taken to sit. Yet the aboriginal species was, of course, a good incubator; for with birds in a state of nature hardly any instinct is so strong as this . . . I raised several chickens from a Polish hen by a Spanish cock—breeds which do not incubate—and none of the young hens at first recovered their instinct, and this appeared to afford a well-marked exception to the foregoing rule; but one of these hens, the only one which was preserved, in the third year sat well on her eggs and reared a brood of chickens. So that here

we have the appearance with advancing age of a primitive instinct in the same manner as we have seen that the red plumage of the *Gallus bankiva* is sometimes re-acquired by crossed and purely bred fowls of various kinds as they grow old."

Here Mr. Darwin speaks of certain breeds of hens recovering their instinct for brooding: if they *recovered* an instinct which they had lost, is it logical or legitimate to speak of them as acting on an instinct by persistent laying? If the one was *in the true sense* an instinct which was, as he says, *recovered*, then the other practice was not due to instinct, but to something else. This is exactly on all fours with the cuckoos which over and over again have in his sense *recovered* the instinct of brooding by sitting on eggs, and these departed from what he says elsewhere is developed out of "occasional habits." There is no escape from this. They cannot both be true and primary instincts.

Mr. Darwin is here dealing with modifications due directly to man's intervention. Dr. Russel Wallace, with his own characteristic clearness, has given warning that nothing can be more unsafe than to argue from such instances to wild-nature, yet surely one general law may be assumed as here controlling both. If certain birds under the direct manipulation of man, and for his own purposes, lose a certain "primitive instinct," and one of the strongest, may we not assume in the case of a wild bird, that it has lost its strong instinct of the same character from the same or similar general causes, that certain changes, certain influences arose upon it at a certain period, broadly corresponding to those that we find can be

brought about by man and operate on creatures under man's control and manipulated by him.

The great question with regard to the cuckoo and its utter loss of the brooding instinct is this—what were the changes or influences which, at a certain definite time, led it to abandon its brooding propensity ?—its former habit of brooding being, as we saw already, proved even now occasionally by reversions to this very habit, and, unlike the tame fowls, it has to seek otherwise an attainable means of securing the same end. The tame fowls did not do this ; apparently leaving it to man whom they better served by " everlasting laying " to look to this, only wonderfully attesting this original instinct by in middle life or age reverting to primary habit ; while the cuckoos having no man-manipulator to trust to, have themselves to look out for some way to secure the same end. The grand question which Mr. Darwin does not at all face or even try to face is, what in the case of the cuckoo were these changed conditions or influences ? There must have been such—whether we can in any way trace them or not, conditions and influences in which general operations of men may have had a share, nay, *must* have had a share, since, nothing is more clear than that no step—not the slightest, towards " improving " the land, etc., etc.—can be taken without effects far-reaching on certain classes of creatures.

Now, in the case of the cuckoo more definitely than perhaps anywhere else, you can trace out the process by which a latent element of reason, giving rise to very marked invention and resource in that bird, has come in to enable it so far to meet and make

up for the changes it could not otherwise resist or subdue. Instead of itself brooding, as assuredly it once did, it contrived to make others do the brooding for it, and, what is yet more, it also managed so to impress on its young the necessity for a certain kind of action in order to its own well-being and sustenance. I do not say whether this is, in the terms of Romanes, simple reflex action, or otherwise—the fact—the necessity of certain actions in throwing out the birds of the foster-parents from the nest is there, and most powerfully strong and availing, and all the more significant that it does not stand alone, but is part of a whole crowd of changes and modifications, all agreeing to secure one grand result.

Mr. Romanes puts down as the prevailing test the following:

"Does the organism learn to make new adjustments, or to modify old ones, in accordance with the results of its own individual experience? If it does so, the fact cannot be due to mere reflex action in the sense above described; for it is impossible that heredity can have provided in advance for innovations upon, or alternations of its machinery during the lifetime of a particular individual."

This points, though it was not meant to do so, exactly to our difficulty as regards actions of the young cuckoo, thoroughly opposed to its proper and earlier instincts.

But even these exceedingly able men, by their very aptness in thinking, sometimes bring out in painful prominence their lack of special knowledge or observation in which they ought to be pre-eminently strong.

Here is a proof, from quite another point, of what

I say. At p. 298, *Animal Intelligence*, Mr. Romanes writes:

"The goat-sucker, when its *nest* is disturbed, removes its eggs to another place; the male and female both transporting eggs in their beaks." Now, from this would it not appear that the goat-sucker is a nest-builder and a layer of many eggs? One of the leading peculiarities about it is that it *builds no nest*, therefore its nest cannot be disturbed. It never lays more than two eggs, and *often only one;* so that Mr. Romanes' picture, set so close to the procedure of the partridge, which may have as many as twenty eggs to remove, is very out of joint, and misleading as to the bird's ways; and his words about male and female transporting *eggs* in their beaks is a gross inaccuracy and exaggeration, and something worse—worse surely in regard to many cases, where the female bird lays but one egg. But Mr. Romanes, quite *unconsciously*, as it would appear, corrects one of his own errors at p. 292, when he writes that "the stone-curlew and goat-sucker deposit their eggs on the bare soil," which, as regards the goat-sucker, is not quite correct either, for as often as not the egg or eggs is laid simply on dried grass or fern at the foot of a tree; and round about Coldharbour, near Leith Hill, at Mosses' Wood, and elsewhere, where night-jars abound, we have more often found it so than on the bare soil; but, assuredly, it makes no nest.*

*And who corrected Mr. Romanes' proofs? Surely he did not do so himself, for scientific names of birds are awfully blundered—instance, *Melothrus canariensis* instead of Molothrus *b*onariensis, for one, and *Molothrus badius* becomes M*e*lothrus *c*adius for another!

Mr. Darwin and Mr. Romanes, for one thing, might have done far more for the science they loved so well had they devoted almost half-a-year at the proper season to the study of the cuckoo and nothing else, not forgetting the problem of the young cuckoos left behind, to stay on at least a month after the old cuckoos have migrated—one of the most wonderful things about the species—and, taken along with some other things, makes them wholly unique; and yet on this point, as well as on some others, neither of these great authorities says a single word, though they both close as though once for all they had settled the whole mystery of the cuckoo and left nothing unmet. Evolution, as they lay it down, is taken to exhaust the whole thing—to us, even after evolution has done its very best in their able hands, the mysteries not only remain, but are increased. To increase the mystery about a very familiar bird is not, surely, the true end of science—evolutionist science!

In *Animal Intelligence*, p. 307, Mr. Romanes quotes the first part of the passage we have given from the *Origin of Species* on the cuckoo, and he actually adds a note to the passage thus:

"Allusion is here made to the fact that the cuckoo lays her eggs at intervals of two or three days, and, therefore, that if all were incubated by the mother, they would hatch out at different times—a state of things which actually obtains in the case of the American cuckoo, *whose nest contains eggs and young at the same time.*"

As though this were such an exceptional fact in bird-history as to justify this wonderful note. Both Mr. Darwin and Mr. Romanes unfortunately (as we

have said already) accepted almost implicitly Jenner's statements and explanations. From my own observations and those of several others, I am doubtful if cuckoos do not lay a greater number of eggs than is generally supposed, and, in a general way, at intervals of two days at most; this is nothing extraordinary, and certainly it is extraordinary to learn that any bird is fed by the parents or foster-parents for *five or six weeks* after it flew.*

Dr. Rey, the great German oologist, to whom we have already referred, quoted by Dr. Bowdler Sharpe (Allen's *Naturalist's Library*, "Cuckoo,") declares that cuckoos lay as many as twenty or twenty-one eggs, and within intervals of each other much shorter than is generally believed. Dr. Bowdler Sharpe puts a mark of exclamation at this, which, no doubt, is meant to undo the effect of his quoting it, and yet if it was deserving only of silent discredit, was it really worth his while in using up his valuable space with it?

Mr. Gurney agrees that the cuckoo lays a much greater number of eggs than is usually believed.

Colonel Irby tells us that "a female (cuckoo), shot

* "The American cuckoo" (it should be cuckoos) "being well known to build its nest and rear its young in the ordinary manner" (Romanes's *Animal Intelligence*, p. 301). And "that the small size of the egg is a real case of adaptation in order to deceive the small birds (in whose nest it is laid), we may infer from the fact of the non-parasitic American cuckoo laying full-sized eggs." (p. 306.) All which is wrong for the inference cannot be drawn unless blindly—the American cuckoos—the two commoner American ones—being largely parasitic, and depositing their eggs in the nests of larger birds than our cuckoo, as is the case with the Egyptian cuckoo and the Indian koel; so that the imaginary fact here based on can give no reason for parasitism at all.

in the second week in May, had then two eggs remaining in the ovaries, nearly ready to lay. Verner found, on the 25th June, 1879, near Gibraltar, a cuckoo's egg in a wood-warbler's nest." *

Colonel Butler wrote to the *Zoologist* from Brattingham Park, Suffolk, the following, which appears in that magazine in 1895, p. 229:

"On May 25, I found, on the ivy over a potting-shed in my garden here, a robin's nest containing a young cuckoo about a week old, so that the egg from which it was hatched must have been laid quite at the beginning of May; and I also heard of another bird in the neighbourhood rather older, so that the egg in that instance must have been laid earlier still. The young bird in my garden was discovered by my noticing four young robins—only just hatched: in fact, one was still in the broken shell—lying on the ground below the nest. On looking into the nest to ascertain the cause, I found a young cuckoo in possession; he must have turned his companions out, therefore, almost as soon as he was hatched."

XV.

Now, how does this bear on the question before us? If the cuckoo begins to lay in the very early part of May, which there are the very best reasons for believing she does (for I have found eggs then), and goes on laying, she must at the least lay eggs till the 25th of June, as the Gibraltar cuckoos do, and even later, as some instances testify that our cuckoos

* *Ornithology of Straits of Gibraltar*, p. 135.

do. It is easy to be seen that, as no brooding comes in to interrupt the laying, she must at the least lay a dozen eggs, and that is allowing a good deal more than four days between each of them. If the demands of migration would, in our country, make it impossible that she should rear and feed, after fledging, the young from an egg still in the nest on 25th of June, this certainly cannot apply to the eggs laid up to the second week of May and before it.

A point for Dr. Charles Creighton: if our cuckoos go on laying eggs up to anything like the date given here for Gibraltar (and I have proof that they do it in record of my own observations), then that would allow nearly, if not quite, a fortnight for observation after the date he sets down with such decision for Jenner, and, from my own experience, a good deal can be observed in a fortnight by one who can devote all, or almost all, his time to a special purpose, and has some scientific curiosity, determination, and patience to lie or to stand still for hours.

All Mr. John Hancock's observations of young cuckoo turning out eggs and young of hedge-sparrow were within a fortnight—nay, really within a week; while Mr. John Craig's yet more remarkable and fruitful observations and experiments, resulting in a whole series of valuable and unique snapshots, described in the preface, were really accomplished in eight days in the case of one nest, and in the case of the other, within a week.

And this position of mine is certainly confirmed by Mr. J. H. Gurney's words:

"The latest egg I have found was on June 28th, but Colonel Butler tells me of a fresh egg in a yellow-

hammer's nest on July 3rd, and of a young cuckoo unable to fly on the 28th July last."

Further yet: Mr. Rowley (*Ibis*, 1865, pp. 178-9) says that, from personal observation, he believes the period of laying to begin in the beginning of May and to go on at least to the middle of July, he having taken eggs of the cuckoo's as late as on the 29th of that month.

In certain seasons, in certain parts from which the cuckoos migrate early—that is, in the latter part of July—it is, of course, impossible that, in the case of eggs laid so late as to show young cuckoos only a short time before the 28th July, and eggs taken from nests on the 29th, the elder cuckoos should be able to do the service of removing the companion foster-parents' eggs, and, still more, the young ones, after their hatching, which generally follows that of the cuckoo — the cuckoo's eggs, like the eggs of the American *molothrus* or cow-bird, as we shall see afterwards in the proper place, needing shorter incubation by some days than those of the victimised birds—another most remarkable fact in the economy of the bird, more especially considering the thickness, and hardness, and heaviness of shell of the cuckoo's egg. The cuckoo's egg, indeed, contains the shell matter requisite for an egg the normal size of the bird, and the contents are, so to say, concentrated.*

And here arises another question. Many of those who wish—following Jenner—to shorten the period of the cuckoo's sojourn here as much as they possibly can, in order to gain one point in their favour, have also to show how in this case the young foster-birds are

* Miller's *Essays and Nature Studies*, p. 59.

thrown out of the nest. This point will recur in a later section. Another difficulty. These young birds that are still to come out of eggs yet unhatched a few days before the 28th of July, most distinctly cannot enjoy the long period of five or six weeks feeding by the foster parent, after they fly, because that would carry them far beyond their date of migration—middle of September: that is, allowing ten days for brooding, twenty in nest before flying, and between five and six weeks for being fed after they are able to fly. Two months and a half would bring them, at the latest, into the middle of October. Either, then, they migrate at the proper time—middle of September, at latest—or they do not migrate at all, and remain all the winter in this country—which is it?

Dr. Bowdler Sharpe makes this record about the American cuckoos:

"There seems to be even with this well-behaved parent (!!) the same difference in time between the deposition of the eggs as is to be found in the case of *Cuculus canorus*. Audubon relates that he found a nest in which were five young cuckoos and two eggs. Two of the young birds were sufficiently advanced to scramble out of the nest, and the other three were of different ages—one being just hatched, another several days old, and the third still further advanced, covered with "pen" feathers, so that it would have been able to fly in about a week. His friend, Mr. Rhett, in whose garden the nest was found, assured him that he had known as many as eleven young cuckoos to be reared in a nest in the course of one season."

Mr. Blyth gives, fortunately, a longer account of

the nests at Mr. J. F. Rhett's house, near Charlestown, in South Carolina, direct from the words of the persons there :

" Two young cuckoos, nearly ready to fly, scrambled off from their tenement among the branches of the tree, and were caught by us, after a while. The nest was taken and carefully handed to me. It still contained three young cuckoos, all of different sizes, the smallest apparently just hatched, the next in size probably several days old, while the largest, covered with pen-feathers, would have been able to leave the nest in about a week. There were also in the nest two eggs, one containing a chick, the other fresh or lately laid. The two young birds which escaped from the nest, clung so firmly to the branches by their feet, that our attempts to dislodge them were of no avail, and we were obliged to reach them with the hand. On now looking at all these young birds, our surprise was indeed great, as no two of them were of the same size, which clearly showed that they had been hatched at different periods, and I should have supposed the largest to have been fully three weeks older than any of the rest. Mr. Rhett assured us, that he had observed the same in another nest . . . and that eleven young cuckoos had been reared in it in one season, young birds and eggs being in it together for many weeks in succession.

" On thinking this over," the account proceeds, " I have felt most anxious to discover how many eggs the cuckoo of Europe drops in one season. If it, as I suspect, produces, like the American bird, not fewer than eight or ten, or what may be called the amount of two broods in a season, this circumstance would

connect the two species in a still more intimate manner than theoretical writers have supposed them to be allied." *

Then Mr. Blyth refers to domestic pigeons as wanting to lay again before the former brood are quite ready to leave the nest : in no case of birds that I have set up to breed has this not frequently been the case : canaries especially wishing to turn the young brood out of the nest to lay in it again.

Mr. Blyth, after having referred to the migratory instinct of the common British swifts being so strong that they will sometimes leave later broods to starve, asks whether the instances referred to by Mr. Audubon of eggs of the American piayas being found in other bird's nests happened at a late period of the season. This is a most important point, and if it has not already been answered by American ornithologists, I hope that it soon will be, to enable us to compare more satisfactorily these American piayas with our *Canorus*.

Now, in view of all these facts, is it likely—the least likely—that our cuckoos, which had passed through long processes of change and differentiation, at length involving the complete dependence on others for brooding the eggs, and much consequent risk and loss, would cease, in view of the preservation of the species, to produce so many eggs as it had done in the days when it was like its American congeners in the points wherein it now differs from them ? If the preservation of the species is the one great end of the breeding process, then it is clear that certain of the modifications very gradually effected on the cuckoo

* Quoted by E. Blyth, *Asiatic Soc. Jl.*, 1842, pp. 1206-7.

were not in the line of the preservation, not to speak of the increase of the species.

And here indeed arises a whole set of facts of the most interesting and suggestive character.

The reed-warbler's nest has an incurved rim, and is, compared with most other nests, very deep; so that, as the nest, attached to reeds or stems of sedges, and other water-plants sways about much in the wind, the eggs or young ones can't be thrown out. I myself three years ago found in north-east Essex a nest of the reed-wren from which the young ones had flown, and noticed that it was very irregular looking at the bottom, I put in my finger, and was surprised to find it at one side very hard, and pulling off the lining of moss, grass, hair, etc., nicely felted, there was a cuckoo's egg lying cold, buried, in fact. The wren had, for the reason given above, been unable to eject the egg, and had simply built it over, putting, in fact, a second bottom into the nest, and as she had to do this, be it remembered with eggs of her own in it, she could not make it so regular as the true bottom below, which I now beheld, all smooth and neatly finished.

On mentioning this to my friend, Mrs. Perrin, herself a naturalist, and exquisite painter of our native wild flowers, she told me that some time before she had seen in one of the illustrated magazines (American, she thought), a drawing, showing how the same ingenious little bird had dealt with intruded cuckoo's eggs, which it, too, had been smart enough to detect, but could not turn out. The clever little creature had manged to separate the cuckoo's egg from its own, and put over it a layer of small leaves, and

moss, and hair; and then, a second cuckoo's egg being dropped in, it repeated the exact process—the little nest thus becoming, really, a house of three irregular stories—two containing the unborn dead, and the upper a nursery of the living. I can absolutely trust Mrs. Perrin's accuracy in report; and should be exceedingly pleased if any one who remembers the drawing or photograph in the magazine would be so good as to send me, through the publisher, the reference for it.*

Mr. Emerson, in his *Birds of the Norfolk Broadlands*, says that he has never found a cuckoo's egg in a reed-warbler's nest, though he has often found it in the sedge-warbler's nest. This is not at all in agreement with the experience of ornithologists elsewhere—Mr. Bidwell's list gave 62 reed-warblers, out of 909 eggs—and certainly not with my own. But even as regards the district with which Mr. Emerson is connected, the fact leads one to ask a question: what can be the reason—the *reason*, mark you, of such nice distinction between nests of reed-warbler and sedge-warbler over the district of the Broads. Have

* The reed-warbler builds its exquisite hung-nest on sedge or reed-stems, etc., generally; but sometimes it will take a fancy to build in a willow or even a thorn or alder tree not far from a lake or marsh, or even in a gooseberry or currant bush—not too far from water. Mr. Emerson, in *Birds of the Norfolk Broadlands*, gives a photograph of a reed-wren's nest *in situ* in a black-currant bush, but this seems shallower than most of its nests resting on reed-stems, depth not being there so much needed as in the reed-stems, which would sway more to the wind. But how did the little creature come to know this? I have noticed that nests in willow and other nests are not so deep either as those hung on reed-stems.

the cuckoos there discovered that the reed-wren has found them out, and will build over any alien eggs deposited in their nests? There must be some reason, whether we can find it out or not, for the aversion the Norfolk Broad district cuckoos have come to have, apparently, to the reed-wren's nest. Mr. Bidwell's exhibition list told certainly a very, very different story, as to general procedure.

Mr. Emerson's rule cannot, however, apply to any portion of Norfolk, save strictly "the Broad-land;" for we find Mr. J. H. Gurney writing: "It would not be hard to find several marshy places in Norfolk where cuckoos rather abound, and *often* lay their eggs in reed-warblers' nests." And the general fact is borne out by Mr. H. Stevenson, who, in his *Birds of Norfolk*, gave an account of finding reed-warbler's nests in bushes or shrubs (laurels, etc.) near to water.

He wrote:

"The most curious fact in connection with these five reed-warblers' nests, built into shrubs or bushes at the foot of a garden near the water's edge, was the finding a cuckoo's egg in three of them, and a young cuckoo, of course *per se*, in the fourth.* Occasionally, but rarely, I have known a cuckoo's egg deposited in the nest of this species when placed as usual among the reeds; but, in the above four instances, increased size and width and easiness of access afforded, no doubt, peculiar attractions."

And again, at i, p. 387, Mr. Stevenson writes:

"It is somewhat singular that the latter (the nest of reed-warbler), although perhaps the most frequently

* i, p. 117.

used of all, should be almost invariably omitted from our published lists."

Mr. Norgate has made one very remarkable discovery, which is cited by Mr. Gurney in his paper. He has noticed in reed-warblers' nests, where cuckoos' eggs were laid, cuckoos' feathers woven into the outside and bottom of the nest; and his notion is that these are put there by the cuckoos themselves to accustom the reed-warblers to the smell, as they have not been met with in other nests. This would indicate that particular methods and expedients have to be resorted to by the cuckoos in the case of the reed-warblers.

Mr. Gurney's own explanation of the undoubted tendency of some cuckoos, in certain circumstances, to hang about nests has a bearing here. He thinks that this is done more especially when the egg has not been properly matched. One case, he cites, was that of a reddish egg in the nest of a reed-warbler; and there the cuckoo "was close at hand, perhaps from a consciousness of the wrong colour, which rendered her anxious."

And he has this further reflection on this matter:

"If the foster-bird is not quite happy with the splendid usurping egg, which she is deluded into the belief that she herself has laid, she will perhaps move it from one side of the nest to the other, and, if there is reason to think it unfertile, ultimately bury it in the lining of the nest, rejected. In June, 1879, Mr. Norgate saw a cuckoo's egg, in Hockering Wood, on the ground beside a tree-pipit's nest, which egg had some hours before been seen to be in the nest; and

there are similar evidences by other observers, showing the disposition above mentioned." *

"That year," writes Mr. W. J. C. Miller, late Registrar to the General Medical Council. "it happened that a pair of robins had built a nest in a box in our garden, and had there laid two eggs. But on looking in one morning, I saw a similar egg, though a little bit larger, lying close beside the other two. Up to that time, I had only seen a cuckoo's egg when laid beside the 'eggs of heavenly blue' of the hedge-sparrow, where it was clearly to be recognised. And the hole in the box was much too small for a cuckoo ever to get through. This, however, was a cuckoo's egg, which must have been brought and placed there by the cuckoo's beak. It would have been interesting to note the hatching of the young cuckoo, and watch its behaviour towards its nest mates; but whether the robins had ever been deceived or not I cannot say; anyhow they forsook this nest and went off and built and reared their brood in another box." †

In this case, it may be inferred that the cuckoo, which could manage to introduce an egg here could not manage to take one out, and so the little robins declined to have the extra egg and deserted the nest —another instance of cuckoo's egg rejected by a small bird.

* *Trans. Norfolk and Norwich Nat. His. Soc.*, p. 369.

† *Essays and Nature Studies*, p. 26.

XVI.

THE analogy with America here is strong. Several of the American birds will not receive the cuckoo's eggs. One of them is Bullock's oriole: she rids herself of the cuckoo's egg by at once throwing it out, and not resting till she has done so.

Another observation of Mr. Gurney's, faithfully recorded, suggests yet further and more indirect means of promoting their own chances for foster-parents on the part of cuckoos.

He writes:

"On the 20th of May, 1897, my son and I were in the pursuit of swallow-tailed butterflies on Sutton Broad, when three cuckoos passed me, one behind the other, probably a hen and two cocks. After flying over a small bog-myrtle or sweet gale bush, not more than two feet high and six feet long, standing by itself on the fen, they betook themselves to an adjoining field. In three or four minutes my suspicion was aroused by one cuckoo returning, which, not heeding me, entered the bush where it remained, but though drawing near very cautiously, I could not see it there, small as it was. When at length the cuckoo had gone, a minute search revealed nothing, and we were just going away, when some ten feet from the bush, the marshman nearly trod on a new yellow wagtail's nest in the grass. It was empty, but scattered round were five young wagtails, quite a week old, the furthest one six feet off, the others nearer, no doubt dropped where we now saw them by the cuckoos. I can only come to the conclusion that this was a cuckoo which

CUCKOOS SUSPECTED OF DESTROYING YOUNG BIRDS

had a predilection for yellow wagtails' nests,* and as nothing else would suit it, its motive in this instance was, by removing the young wagtails, to incite their bereaved parents quietly to build a new nest, and again lay eggs beside which the crafty cuckoo might deposit her own. It may be when my binoculars were on the bush was just the time when the cuckoo happened to be searching to see if this had been done.

"It is true there are stoats on the marsh, but the dead nestlings showed no marks of teeth. Their relative position, and that of the nest and bush, can best be shown by a sketch, and, accordingly, the accompanying drawing has been made from my recollections of this rural tragedy in bird life by our well-known draughtsman, Mr. Keulemans."

Our "accompanying drawing" is here presented by kind favour of Mr. Gurney.

This above noted conduct of the reed-warbler would seem to be exactly on all-fours with the procedure of some of the species on which *Molothrus bonariensis* (the cow-bird of North America, the Argentine and elsewhere) is parasitical. Some species, however, though they do not throw the parasitical eggs out, which would seem the simplest plan, have discovered how to get rid of them, and so save themselves the labour of making a fresh nest. Their method is to add a new deep lining, under which the strange eggs are buried out of sight and give no more trouble.

"The *Sisopygis icterophrys*—a common tyrant-bird in Buenos Ayres—frequently has recourse to this ex-

* Mr. Bird found a cuckoo's egg in a yellow wagtail's nest near Suttton, May 23, 1890.

pedient; and the nest it makes being rather shallow, the layer of fresh material, under which the strange eggs are buried, is built upwards above the rim of the original nest; so that the supplementary nest is like one saucer placed within another."

And the writer goes on to tell how, finding such a nest one day, he tore off the upper bottom to find three molothrus's eggs, two rotten, but the third with a living embryo in it ready to hatch, which was very lively and angry when, excluded from the shell, he took it in his hand. He goes on to say:

"The young tyrant-birds were about a fortnight old, and as they hatch out only about twenty days after the parent bird begins laying, this parasitical egg, with a living chick in it, must have been deeply buried in the nest for five or six weeks. Probably, after the young tyrant-birds came out of their shells and began to grow, the heat from their bodies, penetrating to the buried egg, served to bring the embryo in it to maturity, but when I saw it I felt (like a person who sees a ghost) strongly inclined to doubt the evidence of my own senses." *

Dr. Elliot Coues confirms this, remarking that certain species of birds decisively reject the molothrus's egg, and build a two-storey nest, leaving the obnoxious egg in the basement. I want no better proof that birds possess a faculty indistinguishable, so far as it goes, from human reason. Instinct, in the ill-considered current sense of the term, could never lead a summer yellow bird up to building a two-story nest to let a cow-bird's eggs addle below. No question of inherited tendency here.†

* *Birds of the Argentine*, p 112.

† *Birds of North-West*, p. 183.

Mr. H. S. Rodney reports having found in Potsdam, N.Y., May 15th, 1868, a nest of *Zonotrichia leucophrys* (white-crowned sparrow), of two stories, in one of which was buried a cow-bird's egg, and in the upper there were two more of the same, with three eggs of the rightful owners.

Mr. E. A. Samuels, in 1862, wrote: "Some birds build over the strange egg a new nest." *

Mr. Romanes writes:

"We may perhaps at first sight wonder why some counteracting instinct should not have been developed by the same agency in the birds which are liable to be thus duped; but here we must remember that the deposition of a parasitic egg is, comparatively speaking, an exceedingly rare event, and therefore not one that is likely to lead to the development of a special instinct to meet it."

See how nicely here the whole difficulty is got rid of by an easy assumption! But there are instances of birds—wrens, reed-warblers, robins, wagtails, etc.—abandoning nests because of the intrusion of a cuckoo's egg. I myself have met with two cases in North-East Essex, where in certain parts cuckoos so abound, that I do not agree with Mr. Romanes that the deposition of a cuckoo's egg there is "an exceedingly rare event." The nest of a wood-pigeon, and the nest of a sedge-warbler, and, in a third case, in the nest of a reed-wren, the cuckoo's egg was thickly rolled in small leaves and moss at the bottom, and put to one side, that it might not be hatched by receiving heat from the sitting bird's body. Now, here the question for Mr. Romanes's disciples, admirers, and

* *Birds of New England*, p. 340.

followers is, as it would have been for him, had he still been with us, to tell why the gift of detection has been so clearly conferred on some birds, that they will not receive a cuckoo's egg at all. If instinct suffices for them, why not for all the others? though their own interests, and the increase and continuation of their own species, were clearly threatened by it. And yet Mr. Romanes contents himself with saying that, except as regards the question of some voluntary power of colouration of eggs, there is nothing connected with these instincts of the cuckoo and duped birds that presents any difficulty to the theory of evolution. If not to it, they most certainly did to him; and that he did not see or feel it is exactly our point proved.

XVII.

If the cuckoo lays a larger number of eggs than is generally supposed, as both Dr. Rey and I believe—though I do not tie myself to Dr. Rey's number, and if I may draw any inference from the immense number of cuckoos in the area with which I am best acquainted, then it is beyond all things clear that "the deposition of a parasitic egg" is far from being "comparatively an exceedingly rare event:" eggs having been found by me in nests which it is not generally thought that the cuckoo at all has resource to—in the nests of starlings, thrushes, linnets and larks—(on the ground, mark you, where the throwing out would be difficult) and bullfinches, namely. Whatever errors the individual cuckoos may be guilty of, or whatever necessity

may lead them to choose such a course in dropping eggs into nests, the true eggs of which are easily discriminated from that of the cuckoo; yet I am convinced that in the vast majority of cases the cuckoos' eggs are so well matched with those among which they are intruded, that even by experts they are very often not recognised, even though seen, and thus has arisen the wholly misleading and erroneous idea to which Mr. Romanes gives all the support he can that the "deposition of a parasitic egg is comparatively an exceedingly rare event." The unmatched eggs, which, as I believe are, after all, a minority, are more noticed than the matched eggs—a point which is egregiously proved by this that up till a comparatively recent date it was not believed in England that cuckoos laid blue eggs, the *Cornhill* writer quoted, and Mr. Luke Ellis did not believe it, when they wrote recently—a thing certainly not creditable to the observing power and patience of British naturalists, for here German observers had long anticipated them!

Mr. Bidwell has in his collection, which he was so very kind as to invite me to see, a cuckoo's egg in a redstart's nest, which is so well matched, that even the late Mr. John Hancock, when he first saw it, would not accept it as a cuckoo's egg! and it was only after very careful, prolonged and minute examination, and on certain very indistinct markings being pointed out to him by Mr. Bidwell, that he would at length admit it was. When specimens are found thus so well matched, that even an expert and practical field ornithologist like Mr. Hancock is in doubt about them, and in nature would no doubt have passed them over, what is extravagant in the position that large numbers

of cuckoos' eggs are missed simply because they ar so well matched—missed and never recognised even when seen as being cuckoos' eggs? It almost tempts one here to be guilty of a small joke, and to say that the cuckoo has not only managed to dupe, *gowk (Scotticé)*, or take-in small birds, *many* of them, but *some* even of the *great* ornithologists and men of science also, thus oddly reversing natural positions. And certainly I for one cannot accept Dr. Rey's notion of excess of unmatched eggs here over matched ones.

Then, if the deposition of a cuckoo's or parasitic egg is, according to Mr. Romanes, "comparatively an exceedingly rare event," how account for the vast collections of cuckoos' eggs that have been made, and that are being made, every year in almost every district of the United Kingdom? When Mr. Bidwell had his exhibition some years ago, which he organised so well and successfully, he showed something like 909 cuckoos' eggs. There are well-known vast, private collections of cuckoos' eggs in various parts of the country (not to speak of those on the Continent, including that of Herr Pralle at Hildesheim), the most extensive and complete being those of Col. Butler,* Mr. Massey, Mr. Norton, and Lord Rothschild, besides those in the public collections or museums, which are constantly being added to and improved, and also sections of the more general collections of well-known ornithologists, such as those of the late Lord Lilford, the late Henry Seebohm, and the late John Hancock, and unnumbered smaller endless private collections, which are constantly being

* Most of the eggs in Colonel Butler's collection were taken during the first week in June.

increased,—all which goes to prove that the "deposition of a parasitic egg is not comparatively an exceedingly rare event." And more than that: if such vast collections of eggs withdrawn does not, in a marked way over a course of years, perceptibly—very perceptibly—diminish the numbers of cuckoos in a given district, then, assuredly, we have here another and most convincing proof that vast numbers of cuckoos' eggs, whether through perfection of matching or not, entirely escape, and the notion that the "deposition of a parasitic egg is comparatively an exceedingly rare event" is thus conclusively blown to the winds, as one of the easy, comfortable assumptions by which late evolutionists get apparent consistency in their very ambitious works!

When we come on such cases as that described by Herr Braune, where he found, in the oviduct of a cuckoo he had shot, an egg so exactly like that of the icterine warbler's that only by this was he led to recognise as the cuckoo's an exactly similar egg in a warbler's nest; and that other reported by Herr Grunach, who, in a most abnormally coloured egg, quite unlike the ordinary eggs of the cuckoo, by dissection undoubtedly found the cuckoo parentage of the bird inside by the zygodactyle feet; or that of Messrs. Seebohm and Elwes, who decisively established the fact of cuckoos laying blue eggs by finding the young bird inside a blue egg with zygodactylic feet, we may well be excused implicitly accepting dicta of certain kinds too frequently given us, as though all was practically and satisfactorily explained under certain axioms and theories about the cuckoos and their ways.

The time that elapsed between the date (1787) of Jenner's observation and those of Messrs. Seebohm and Elwes, who conclusively demonstrated the fact of cuckoos laying blue eggs was, as already said, about a century—a century on which English ornithologists would pique themselves, regarding it as one of the greatest activity and definite result, with evolution, natural selection, etc., etc.—and the very fact that cuckoos' blue eggs for so long escaped all notice whatever, is a kind of justification for our saying that points of almost equal importance about this mysterious bird may be overlooked even now. One of them, the very frequency of parasitic deposition, in opposition to Mr. Romanes' easy, very easy assumption that it is so "comparatively an exceedingly rare event" that it wasn't worth while for mother nature to arm the hosts of little birds by counter-instinct to prevent and defeat it; and so with a full appearance of philosophy get quit of that difficulty by a most monster assumption—the most pretentious *petitio principii* that I, in the language of the delightful Artemus, "have ever experiunced." Besides, just realise where these fellows go. Instead of patiently looking and pointing us to new facts, they are keen to speak *ex cathedra* for mother nature in what she might, may, would, could, or should do. Mother nature, you may rely on it, will not come and make her bosom bare in this sort of way, even to them. She doesn't come: indeed, she mostly goes; and she has no back hair or odd fal-als about her, on which you can lay hold to hinder her, either, or pull her back. All you can do is very laboriously and humbly to follow after—often even with sighs, and groans,

and weary feet: and I may even venture to say that she does hate the fellows that want to show wiser or deeper than she is, and would pose as if they knew everything.

XVIII.

Colonel Butler had a query in the *Zoologist* (or *Ibis*)—certainly one or other—some years ago, respecting the power of the woodpecker to see in the dark. His query arose in this way. He found a woodpecker's nest with one egg. Cutting a round, circular piece out of the tree, just below the nest, he was able to extract the true egg, and to put in its place a thrush's egg—about the same size and shape, though very different in colour. Having done this, he at once filled up the hole with the bung, as near as he could, exactly colouring it over to the likeness of the bark of the tree. Almost to his surprise, after all this, he found that the woodpecker stuck to the nest; and when she had laid four more eggs, he took out the bung, and found, to his surprise also, that the thrush's egg had been rolled into the recess left by the bung just there not penetrating far enough in to get even surface inside as well as out, and the thrush's egg almost fell out when he extracted the bung.

Now, it was clear that when the bird was in the nest the place was quite dark beneath her; and how did she know that the thrush's egg was not her's—which she most conclusively proved that she did? But have birds no sense either of touch or of smell? Either of these senses might have aided the bird even if no light was there.

The coot will not sit upon duck's eggs. The sense of touch and smell in certain birds must be very keen: for a gentleman, a friend of mine and true naturalist, in Essex, has persevered with experiments with the coot in this direction: he had at last the eggs both of the teal and mallard carefully coloured to imitate the coot's eggs, and, taking away the coot's, these ducks' eggs were carefully substituted. But the wary coots were not to be done: in all cases they abandoned the nests and at once set about laboriously building others at different parts of the pond side, and nothing would tempt either of them back again, though their own eggs were restored. They would not be tempted to go near the nests nor look at them. The argument suggested by these facts is exactly on all fours with that from the woodpecker and the thrush's egg. And one question which arises here is important indeed. If the woodpecker in the dark is able so decisively to detect the egg of a thrush about the same form and size as its own, and to deal with it effectively, why is it that so many birds fail to discriminate, and in their open nests with full light to aid them, between a cuckoo's egg, which is much bigger frequently and almost always a little bigger, than their own eggs, and will adopt it and hatch it, and at great labour, rear the alien nestling, to the utter destruction of their own brood, their instinct or intelligence just there failing to protect the species. Is the one instinct a lack of instinct or a "misleading instinct" —which? They cannot both spring from the same source. Besides all which, the little birds many of them must have had experience and have utterly failed to profit by it; while the woodpecker, with no

experience at all, rejects an egg which to certain senses must in the dark seem very much like its own, or the coots rejecting the ducks' eggs and deserting the nest.

In one word, Nature has here armed the woodpecker and the coot with a wonderful instinct against brooding alien eggs—an instinct, by the way, which is seldom or never called out: while Nature has failed—absolutely failed—to arm many small birds with any such instinct as regards cuckoos' eggs. Why is this? Mr. Romanes argued with all his might that the deposition of cuckoos' eggs was "comparatively so exceedingly rare an event" that Nature had not deemed it worth her while to call out a counteracting instinct, mark you; but here is a puzzle which has three branches: (1) she has, apparently, armed the woodpecker and coot with this instinct without any great call to do so—deposition of alien eggs in their nests being certainly "an exceedingly rare event;" and she has not so armed many birds where there is assuredly the very greatest call: for (2) the deposition of cuckoos' eggs is not, either here or in foreign countries, "an exceedingly rare event"—whole species being much reduced on this very account; so that Mr. Romanes was either writing in ignorance, or writing so from design, helplessly. The problem remains: Why has Nature bestowed on certain birds so strong an instinct, which is seldom or never called into exercise, and refrained from bestowing it where, for preservation and increase even of the species, it was so much needed; and (3) how is it that a few species of birds, more and more in all countries, have come, and are coming, to reject or to build over the cuckoo's egg?

Nature, from the Romanes point of view, seems to be so very capricious that she has no laws at all—she arms birds with a strong instinct where, practically, they don't need it—the deposition of a thrush's egg in a woodpecker's nest being, not comparatively, but absolutely, an "exceedingly rare event," and where they do much need it — the deposition of cuckoos' eggs in the nests of other birds being, by comparison here, not at all an "exceedingly rare event," she takes care to think it not worth while to arm them against it, or to allow them to learn anything by constant experience of injury to the species. In a word, Nature—too like, alas! to Jahvè, the Hebrew god—is, according to Mr. Romanes, a playful, capricious bully and tyrant, full of favouritism and of unreasonable dislikes—allowing some species to increase by wilfully depriving others that more minister to man's pleasure, of countervailing instincts, which she does not think it worth while to bestow, to develop, or to call out, because "it isn't worth her while." Mr. Romanes was a bit of a theologist: here he is so, too, and didn't know it.

When, therefore, Mr. Romanes said that Nature, because of the rarity of deposition of cuckoo's eggs, had not thought it worth while to bring into play a counteracting instinct in the little birds, he was doubly wrong—wrong (1) as to the fact of the deposition of cuckoo's eggs being, "comparatively speaking, an exceedingly rare event;" and wrong (2) as to the fact that Nature had not thought it worth while to call into play in victimised birds a counter-balancing instinct. And the question to be answered by Mr. Romanes' friends and disciples now is, why Nature

has called into play this counter-balancing instinct in some few species and not at all in some others. If they will satisfactorily answer that, then we shall heartily thank them: till then we shall take leave to say, that so far as they follow their master, they but make "confusion worse confounded," by assuming certain things, and then, on the ground of these false and most groundless and ignorant assumptions—speaking categorically for Nature in her doings or not-doings.

And how does Dr. Russel Wallace reconcile this with his law, that useful variations tend to increase, and useless or hurtful to diminish?

XIX.

THE assumption, moreover, that parasitic deposits were so rare that it was not worth while for Mother Nature to generate a counteracting instinct to defeat them, is fully met and upturned by the facts we have just dwelt on; and, besides that, the mystery here, by Romanes' suggestion, is only deepened: for, if Mother Nature has not deemed it worth while to bring in any counteracting instinct to defeat such parasitism, then she seems just here to have gone a shade too far in the direction of "survival of the fittest"—if fittest is indeed to mean anything else than "survival of those that *survive*." "Fittest!" How are you to discriminate and justify such procedure here on your own ground? Goethe put it clearly from his point of view: "Nature does not appear to be very scrupulous. She has a good fund

of life to lavish, and she does so now and then without much hesitation. *But how does it happen that so many young singing birds are lost for a single young cuckoo?*"

This suggests to us a very different notion from that of Mr. Romanes, who too boldly spoke for Mother Nature. Nature, on a broader reading, is perpetually contriving, by the ministry either of special families or special individuals of these families, to meet, modify, and defeat such plans as those of Mr. and Mrs. Cuckoo. The secret of deserted nests may often, in our idea, be found here. It is certain that not only do some species reject the eggs of the cuckoo, but that, more and more, certain individuals of other species come to reject them, build them over, wrap them round with moss, etc., etc., and refuse to hatch them. See you, the balance of Nature is something, and is preserved in ways so subtle, that such assumptions as those of Mr. Romanes are at once very bold and very blind; for, in our idea, in precisely other ways than that does Nature work. She is ceaselessly modifying, advancing; showing by more gradual and subtle processes that species do awaken to the fact of non-production of their own kind through such practices as that of Mr. and Mrs. Cuckoo. And just look for a moment at this fact. The more that these cunning pairs in a district succeed in victimising gullable birds, they reduce exactly in proportion their numbers in succeeding years; so that they are then compelled more and more to have resource to more doubtful nests, or nests of those birds in which the counteracting instinct has been more fully awakened, and thus the balance is in some

degree kept even; otherwise there would be no balance at all. The more easily duped birds would gradually decrease, or even be exterminated, and the cuckoos would so increase, that the inroads, even on doubtful birds, would go on apace. If there *is* anything in this, it might go some way to account for the existence or the increase of unmatched eggs: account for the evidences in certain directions of the cuckoo's methods becoming more and more patent and *observable*—and account, too, for the very belated discovery in our country of the most remarkable points in the life-history of this most extraordinary bird. Thus, instead of there being any ground for Mr. Romanes' assumption, it is proved almost to demonstration that Nature is, as Goethe says, very lavish of life, but also very careful to preserve her balance: leading up to the conclusion that the results of true study of her are exactly in the teeth of such statements as that of Mr. Romanes now specially under notice, and some of those even of Mr. Darwin.

Yet Mr. Romanes, as we have seen, actually says that, "with the one doubtful and not sufficiently investigated exception—that of cuckoos adapting the colour of their eggs to that of the eggs of the foster-parents—there is nothing connected with these instincts that presents any difficulty to the theory of evolution." Surely, there is at least this one other, referred to most unreservedly by Dr. Bowdler Sharpe—the cuckoo now lays an egg which, compared with that of other birds, is of but a quarter the size that it should be, though it is, compared with other eggs of the same size, heavy. How is this, and how has it been brought about? Did the bird always lay

such an egg even when in those days its habits were like those of its American congeners? If not, how did it come to effect such an extraordinary change as to get rid of three-fourths the area of an egg without any the least injury to the vitality or to the size of the young bird that is to come from it? That is quite as remarkable a point as anything about it, and raises a problem exactly analogous to that of colouration of eggs. If the reducing of the size of the eggs was a very, very gradual process, as under evolution it ought to be, how was it that small birds were, through ages, taken in with such a monster egg in comparison with their own—the more that even now, when the egg is so reduced in size and some at least vague effort made to vary colour to imitate other eggs, certain birds are apt to detect it, throw it out, or build it over so as not to hatch it? Surely most birds have some conception of size if they have not of colour; besides this, to brood an egg of such dimensions would be hurtful and inconvenient for very small birds to sit on and to turn over, as they must at intervals turn all the eggs over. Such a size of egg, moreover, would militate against the hatching of certain of the smaller eggs at the proper time by, of course, causing the bird to sit too high above them to keep them all equally warm. Again, if birds—especially small birds—could be thus deceived with one egg of a natural size, or nearer to a natural size, for the cuckoo through long, long ages, what, then, was the necessity for reduction in size and efforts after contrasted colouration? This would then be purely a waste of energy, and still is so.

Or did the cuckoos of the ages far back go on re-

ducing the size of their eggs slowly and yet themselves brooding them till they had brought them to a certain point, and then began, "through the selection of self-originating tricks," their process of parasitism. This would, perhaps, be the most daring instance under evolutionary law of a clear and conscious preparation, in view of succeeding at last in a practical way, "through the selection of self-originating tricks"—the birds of the early time far-feeling forward to our later time, like prophets of infinitely more than Mosaic forecast.

It must have been in one of either of these ways the change was effected, and we should be obliged to Mr. Grant Allen, as the most popular and facile of evolutionist expositors and illustrators, to tell us which it was.

Mr. Kearton writes:

"It is certain that the cuckoo lays more than one egg; but, although naturalists of good repute have mentioned the number as five, and others have been of opinion that even a larger number may be laid, there is, so far as I know, no reliable evidence to support either supposition.

"I have never noticed that young cuckoos exceeded in numbers the old ones, in a given district where I was out of doors all day long, every day in the year, and many years together in unbroken succession. *But, of course, the number hatched could never represent the number laid, although the place to which I refer was singularly free from vermin and collectors.*"*

If so, to what could the great disparity between eggs laid and eggs hatched be due? Special causes

* *British Birds' Nests*, p. 42.

of some kind must operate to maintain so great a disproportion. In our idea it is the large numbers of birds—probably an increasing number—that turn out, build over or destroy the cuckoo's egg, and refuse to hatch it. By this the cuckoos are kept in check, otherwise they would soon dominate other birds altogether and decimate them. We see the same process in operation, in many ways, by which the balance of Nature is approachably maintained. This is another and a new light on Mr. Romanes' random and unfounded assertion that the deposition of a cuckoo's egg must be "comparatively such an exceedingly rare event" that it was not worth while for Nature to develop counteracting instincts.

Unless by one or other agency of this sort, it is evident that we should find some more definite relic of these eggs that come to nothing.*

XX.

ANOTHER point of vast importance, which certainly neither Mr. Darwin nor Mr. Romanes in the least faced, is this, that wherever you find a disproportion

* Gilbert White, in his letters to Daines Barrington, had already questioned the statement that the cuckoo lays only one egg and proposed to examine the ovarium so as to settle the matter.

Jenner found precisely what Gilbert White had expected—that the ovary of the cuckoo was exactly like a hen's ovary, with eggs in all stages, and he concluded, as White said he would do, if the fact were so, that the cuckoo laid a great number in each year.—Creighton's *Jenner and Vaccination*, pp. 12 and 13.

of the sexes, marked and permanent, involving such an excess of males as we find among the cuckoos, you have one of the most efficient tendencies to reduction of the species. The species, then, can only survive by some extraordinary means resorted to by the females—a thing which has exactly happened with the cuckoos, as also, we shall yet see, with the American cow-birds. This extraordinary thing is, in their case, the deposition of eggs in other birds' nests, and the instinct in their young to turn out the eggs or legitimate young from the nests where they may be, to have fullest guarantee they shall be fed and tended. In no case of birds which I have kept in confinement, and have got to breed, is there on the part of the hen any desire for intercourse after one half of her eggs are laid. Most carefully she avoids this, and is wholly unmoved in this direction by any demonstrations of the cock to which he sometimes will yield himself, only then to be firmly put aside by the hen. This is, in conformity with a great law, that after full conception, coition in any form is not beneficial to the progeny, or may not be, and in nature the law in this respect is very obtaining—the instinct on the part of the females being absolute in rejecting all sexual advances. The hornbill cock, when he builds in his mate the moment she begins to brood by plastering up the hole of the nest with clay, leaving just enough space for his bill to introduce food to her, erects a real barrier to intercourse, but that is only a shadow of a yet more real law. Certain of the ducks—more especially the eider ducks and their allies—when the females begin to brood, depart and take to fresh feeding grounds on the coast or in the straits between the islands.

Promiscuity, carried beyond a very definite point, everywhere is adverse to fertility. So far as practice or experiment can be called in to aid us here, it is absolutely confirmatory. The rabbit is one of the most fertile of creatures; but is so fertile because it is so observant of this rule. Here is a proof of it, as far as proofs can be got in such matters as these; when we are concerned with wild creatures more especially. One method of exterminating rabbits, which is said to be found highly successful, is to trap as many as possible, kill off all the does that are caught, and let the bucks loose. "The results of this mode of operation are that the male rabbits, as soon as they begin to predominate in numbers, persecute the females with their attentions, and prevent them from breeding. They also kill the young rabbits that happen to be born, and even, as Mr. Rodier asserts, when they largely predominate in numbers, worry the remaining does to death." *

By the way, notice here in animal life, that excess of males, or polyandrous promiscuity, is not only adverse to progeny by arrest of conception, but is favourable to infanticide.

Now, in the case of the cuckoo, it really seems as though we have an exception to this great law of Nature. The stimulus to the rejection of the male advances by the hen is the attraction to brooding. The cuckoo does not brood, therefore it has no pause of this kind to the desire for contact with the male. If under contact with many males it goes on uninterruptedly laying eggs, this, having regard to all

* *Nature*, vol. xxxix, p. 493, quoted by Coe in "Nature *versus* Natural Selection."

the facts, is an argument for a large number of eggs in a season; for, granting this, there is no reason why it should not have a dozen or twenty eggs a season just as easily as five. Unlike birds that brood, it has no temptation at a definite point to reject male advances, and a vast body of fact goes to prove that it does not: laying eggs soon after it arrives, in the very beginning of May, and continuing to lay eggs up to close on the 29th July, within a few days of its leaving. The risk the eggs have to run is very great —many must be lost, many are dropped in places where they can't be hatched, no doubt, because the hens have not found suitable nests ready for their deposition. The young cuckoos, from the very long period of their helplessness and inability to feed themselves after fledging, must suffer greatly from birds of prey and other causes. If Mr. Darwin could speak thus of eggs of birds which go through the normal process of nesting and brooding, how much must it apply to the case of eggs of the cuckoo committed to the care of others or laid carelessly on open spaces:

"The real importance of a large number of eggs or seeds is to make up for much destruction at some period of life; and this period, in the great majority of cases, is an early one. . . If many eggs or young are destroyed, many must be produced, or the species will become extinct." *

Clearly, there is great destruction of cuckoos' eggs, and, from Mr. Darwin's argument, there must be many produced. Dr. Russel Wallace's idea of the immense destruction of birds' eggs and young in

* *Origin of Species*, p. 52.

normal cases, leads us justifiably to infer that it must be yet greater in the cuckoo's case.

Consideration of these points from this line of fact and reasoning removes again the problem of the cuckoo entirely from time and pressure of migratory instinct, as Darwin and Romanes, following Jenner, put it, to the influence of promiscuity or polyandry (nearly allied), combined with the non-brooding and non-pause, strictly speaking, with regard to sexual intercourse. This is the line which further study of the cuckoos, to be really fruitful, everywhere must take; and by it the empty notion of Mr. Romanes, "that the deposition of a cuckoo's egg is comparatively an exceedingly rare event," will, unless we are all mistaken, be found one of the most baseless things ever written by a wise and clever man.

And then, for a moment, glance at one sentence from the pen of Dr. Russel Wallace:

"It is, as we commenced by remarking, a 'struggle for existence,' in which the weakest and least perfectly organised must always succumb." *

Well, now, just look at the small birds and the cuckoo. Is there discrimination there—any whatever? If there is on the part of the adult cuckoos, it is for the strong parents, all fitted to be very active and to feed their greedy child; but the proper progeny of the foster parents all go, and the assumption from the discrimination would be that they were of this bird "fittest to survive." The young cuckoos often survive; are they the "fittest" over these strong small birds?—which, by the way, are not here

* Contr. to *Natural Selection*, p. 33.

the weakest and least perfectly organised in the sense Dr. Russel Wallace alone can mean.

It is very remarkable that Professor Van Beneden (see *Animal Parasitism*, p. 71), so far as we can understand him, actually notes the fact that promiscuous polyandry in certain parasitic worms and insects leads to something of the same result: the shrinking away of the males to a mere sexual organ, which again shrinks away; the multiplication of males taken under special protection of the female, which, if they become burdens to her, she only resorts to more effective devices to maintain and aid them—leading to wonderful development of the females. The following passage certainly seems to point this way:

"The whole family of the *Abdominalia*, a name proposed by Darwin, if I am not mistaken," (but now superseded and disused) "have the sexes separate; and the males, comparatively very small, are attached to the body of each female. It is a case of polyandria, which we see realised in the *Scalpellum*. Darwin made known the existence of supplementary males, so small and so little developed, that they are with difficulty discovered; and so badly are they provided with organs, that they have neither those of motion, nor a stomach to digest."

Is this then a case of survival of the fittest, or is it not? The males really reduced to shrunk up organs —have they survived as the *fittest?*

XXI.

With regard to the second half of the passage from Mr. Darwin's *Origin of Species*, it really, while professing wholly to solve the problem, practically leaves it untouched. The difficulty most closely presses on this very point which Mr. Darwin slips over in the lightest possible manner; not deigning at all to deal with it. And *the* question is this: whether, resulting from definitely traceable changed external circumstances, or from slightly modified function, or both acting together or reacting on each other—the American cuckoos do now, as Mr. Darwin presumes the ancient progenitor of our European cuckoo did, occasionally lay an egg in another bird's nest. No help is gained by saying that other birds occasionally —(as in the case of pheasants laying in partridges' nests, etc.)—lay eggs in other birds' nests, because in none of these cases do we have any marked or even noticeable tendency to any progress whatever in the same direction as the European cuckoos have, on his theory, taken. The analogy, therefore, completely breaks down at the point where it should be strongest, and is, in fact, no analogy at all. The most marked point about our cuckoos is the smallness of the eggs. The non-parasitic American cuckoos, as he somewhat maladroitly tells, lay full-sized eggs; but if they have for ages occasionally laid eggs in other birds' nests, and are moving on the way to fixed habit in this respect, the eggs should already be a trifle less than full sized.

And this point does not receive the attention we

had a right to expect it would receive, either from Mr. Darwin or Mr. Romanes, as regards the *Molothrus*, an American species allied to our starlings, which have parasitic habits like those of the cuckoo. The *Molothrus bonariensis* lays so many eggs in alien nests that it is hardly possible many of them can be hatched. These birds have the extraordinary habit of pecking holes in the eggs of the foster-parents to ensure that their own young shall be reared—a habit which some observations would lead us to believe our cuckoos sometimes practise, if an egg of theirs is laid in the nest of a bird whose young is large and might be too strong for the young cuckoo to turn out. *Molothrus precius* never lays more than one egg in a foster-nest, so that the young bird is securely reared. What a satisfaction it would have been to know how, as to size, the eggs of the various families of *Molothrus* stood to each other; but men like Mr. Darwin and Mr. Romanes, if they satisfy themselves about important practical points like these, they certainly do not manage to satisfy us very often, indeed. Perhaps that is because we have dwelt too long on one special and particular subject; but that should only gain for us from their followers something like sympathy and appreciation.

"By a continued process of this nature," says Mr. Darwin, "I believe that the *strange instinct* of our cuckoo has been formed." Yes, but as, according to him, the American cuckoos remain, as regards this habit, merely occasional and aberrant depositors of eggs in other birds' nests, what is the element that in our cuckoos determined their passage from this aberrancy—even if we admit it—to definite, sustained,

and most systematic parasitism in this very exceptional and peculiar form; or, at what point may it be set down that the occasional and aberrant habit has become what he all too boldly calls "the strange instinct." I regard this phrase as in itself very unhappy—and, in fact, un-Darwinian. A progress from an occasional and aberrant habit of this kind very gradually advancing and increasing, because of what he really dwells on as observations of, and reflections on, the benefit derived from it, mark you, not only to the elder cuckoos themselves, but to their young ones, are most decidedly separate and conscious acts of reason and comparative judgment of the finest kind—acts of reason, such as, when we find them paralleled by men in trade or commerce, we have no hesitation in designating by another name than "strange instinct." Instinct in this kind should be in a general way unerring; but this does not by any means apply to the conduct of the cuckoo, which, looked at from many points, exhibits all the mistakes and errors which Dr. Russel Wallace, dealing with several points about birds, declares to be really a failure of reasoning power, exactly as in the case of men. We could give no end of instances of this, and will do so if challenged. Nor does Mr. Darwin even glance at such cases of clearly exceptional and mis-calculated indulgence as we find in those great-spotted cuckoos of Spain, where such a number of cuckoo's eggs were laid in the nests of the magpies. Clearly, there, a whole class overdoes it. If these young Spanish great-spotted cuckoos have anything in common with the rapacity of all other young cuckoos, there is not the slightest chance of, say,

eight cuckoos being fed by one pair of pies; and, if they in this respect so very substantially differ from our cuckoos, then another problem arises as to the cause or reason of such an essential difference.

These are but a few suggestions out of a whole list of difficulties that arose on us in reading Mr. Darwin's rather empty and ambitious passages in the eighth chapter of his *Origin of Species* (6th edition). We do not here proceed further in our list, but content ourselves with repeating that, if Mr. Darwin had satisfied himself about the steps of the process he sets down as highly probable—a process which, mark you, gets wholly rid of one form of strongly inherited instinct, and by gradual steps, practise in which is, according to him, determined wholly by long continued observations and considerations of benefit at once to old ones and young, and had thus reached a wholly new method of life and propagation of the species—then, we hold that he was wholly wrong in summing up the result as a "strange *instinct*." In fact, he could hardly have been less discerning, philosophic, and perspicuous than he is in this section of his eighth chapter of *Origin of Species*, where this was perhaps demanded more than perhaps anywhere else in all his writings.

XXII.

Mr. Headley, in a remarkable article in one of the quarterlies some years ago, laid it down that, "as a rule," it is among polygamous species that we find the bird-combatants most desperate, and the antics the most elaborate. The courage and ferocity of the

game-cock is proverbial, he said, by way of short illustration. Now, this points the way to a peculiar physiological fact: polygamy in the lower creatures tends to develop the sexual organs of the male, whereas polyandry among them tends to arrest the development of these organs—to lessen them and to cause after long lapse of time, a kind of shrinking away. This is most decidedly the case with our cuckoos; it is, so far as I can learn, the case with the American and other foreign cuckoos; it is the case with all varieties of the *Molothrus* species. It is the case with certain worms and insects, according to Professor Semper and Professor Van Beneden, as we have just seen. The polyandrous birds do not, so far as I can find out, indulge in the combats that the polygamous birds more especially tend to do; the reduction of the organs allaying passion and making them content to *share* favours; suggesting the question whether in the case of birds, the males of which do now still fight, they had not at one time been polygamous, and that changes and influence of a special kind had not so equalised the sexes as to make polygamy longer impossible. We know, for example, that ground-sitting females are more exposed to danger of various kinds than the males are: and this may be an element in it: the change of nest either in place or in form is largely due to the risk and danger that had arisen on the sitting bird, as in the case clearly of some of the weaver-birds and others we might refer to. The almost apparently arbitrary adoption of domed nests by magpies and jays may also have to do with this—the prevention of disproportion in the sexes.

This matter, as bearing on our subject, may well demand a little more attention and illustration. The slightest influence affecting the sexual parts speedily affects the whole body—more especially those portions of the body which set forth the signs of sexual desire, appetite, or strength. Haeckel says:

"Every change in the sexual organs powerfully reacts on the rest of the body; so, on the other hand, every important change in another part of the body must necessarily more or less react on the sexual organs. This reaction will, however, only in many cases become perceptible in the formation of the offspring which arises out of the changed generative parts." *

Haeckel also speaks of "certain influences which act upon the male organs of propagation only, and affect the structure of the male descendants; and, in like manner, other influences, which act upon the female organs of propagation only, and manifest their effects only in the change of structure of the female descendants. This remarkable phenomenon is still very obscure, and has not as yet been properly investigated." †

There can be no doubt, further, that length of life is largely dependent on certain restrictions, if one may say so, of the sexual indulgence, viewed in certain aspects—that, in fact, the rule with regard to various lower forms of animals, that the moment of reproduction is also the moment of death, in a modified way, still largely prevails through nature. Dr. Ray Lankester has made a great deal of this principle

* *History of Creation*, i, p. 247.

† *History of Creation*, i, p. 230.

in his admirable and able book on *Longevity*. He points out that a very large number of organisms die at once on reproduction, "by the rapid abstraction of the matter of life contained in the eggs and sperm —Protozoa, insects and annual plants." Traces of the same law are to be found in much higher ranks of existence, and among highly differentiated creatures —in fact, the higher you go in this, the more illustrations you find. For example, as Dr. Lankester puts it, "Among birds, smaller broods go with a greater longevity." He finds the same thing, to a certain extent among fishes; writing:

"In fishes, which give personal attention to young, the bulk and number of young are immensely reduced. The pipe-fish (which carries its young in a pouch, and the tube-mouth, which does the same—only the father in the one case, and the mother in the other)—the Hippocampus and Arius of the Amazons. He also finds corroboration of the principle in mules and cut animals, which confirm the hypothesis that generative expenditure antagonises longevity." *

It is the same among certain of the parasitic worms. Van Beneden says, in addition to what we have already noted:

"Between the true hermaphrodites and the true diæcious worms are found species in which the males gradually dwindle and become dependent on the female; this is to be seen in the *Spherulariæ*, among which the male is only an appendage to the female sex. *We find here full evidence of the fact that the female is more important than the male with regard to the preservation of the species.* In some species the

* *Longevity*, p. 76.

sexes differ but little; in others the sexual differences become greater, and the male is only one-third the length of the female, but in some of them the disproportion is greater still. At the same time, we see nematodes where males are attached to the females, so as to appear to form only one single individual; in other cases the male seems to disappear to such an extent that we find nothing but the male organ in the female; indeed there are instances of male worms which, without changing their form, occupy the cavity of the matrix, and, like the learnean crustaceans, are parasites of their females." *

Reproduction in certain circumstances shortens life.

"The American aloe reproduces and dies in about five years in Mexico; in England it elaborates leaves for a hundred years before flowering. Again, the axolotl reproduces in warm Mexico as a branchiferous amphibian; in colder climates its fertility is diminished, it becomes salamandroid before reproducing, thus lengthening life by delaying genesis." †

Then, for another instance, take the stickleback: he is a great fighter, armed and plumed and mailed *cap à pie*, and this because he is a determined polygamist—he is perhaps the most plucky fighter of all fishes—the more he fights the more colour he gets, as though into him passed all the hues of all the enemies he had conquered, and this because he must secure many wives, as many as stock fully his open-ended barrel-built nest with eggs. And the moment his fighting and breeding are ended he subsides into a commonplace little stickleback; he waxes thin and

* *Parasitic Animals*, p. 235.

† Ray-Lankester's *Longevity*, p. 85.

limp and practically dies off for a while—only at the proper season to renew his brilliancy and, as it were, his youth.

There has been a great deal of discussion about the cause or causes of the malformations of horns in deer. Mr. Tom Speedy having pointed out that, after maturity in the twelfth or thirteenth year, the antlers gradually fall off in size and appearance, he proceeds to account for the excessive size of the antlers in certain breeds or herds by saying that no doubt high feeding is the cause, as they are never met with so large in the wild state. He also concludes that the malformation of antlers, single or unicorn in some cases, at different angles in others, and in yet others, one antler growing normally and the other growing downward, may generally be traceable to close breeding or to former wounds. We should say that the former is the cause, pointing to modification of the sexual organs. It is well known that in castrated animals the horns wholly cease to appear or are of the most rudimentary character.

Mr. Parker Gilmore found among the stags of Vancouver Island many with malformed antlers, and this he accepted as an unquestionable proof that their surroundings were not exactly such as nature intended them to enjoy.* Questions about deer and bearings of points in their life-history here, will be treated more fully by me in another volume. We, for our part, have no doubt that the unsuitability of the surroundings directly affected the sexual organs of which the malformation of the horns was but a sign. Haeckel has noticed a peculiar point about the

* *Speedy*, p. 259.

water-salamanders or tritons, which, like frogs in youth, possess gills. They leave the water, lose their gills and develop lungs. If they are prevented from leaving the water, they do not lose their gills. The gills remain and the water salamander continues through life in the same condition as its lower relations, the gilled salamanders, which attain their full size and sexual development, and reproduce without losing their gills.*

The reduction of virile power in the cuckoo males, so that they consent to share the favours of the female; and the lessening or shrinking—in one of the ovaries (as proved by the production of eggs so much smaller than the eggs of other birds and out of all proportion to size) would, on this line of argument, be in favour of long life in the individual cuckoos; and on this point there is much room for careful observation.

XXIII.

And on what true scientific ground can Mr. Romanes say that the habit of the thrush in taking snails to stones to break the shells, and the flying up of crows and gulls with shell-fish to drop them on rocks or stones so as to smash the shells, "must originally have been intelligent actions purposely designed to secure the ends attained,"† and then deny that originally the habit of the young cuckoo to turn out the true occupants of the nest was a "truly intelligent action purposely designed to secure the ends attained."

* Haeckel's *History of Creation*, i, p 241

† *Animal Intelligence*, p. 283.

Here the action was as direct as any action could be to secure the end desired, though it is very evident that it was an action right in face of some strong antecedent instinct which prevailed when, like certain of the young of the American cuckoos, ours were brooded, as *they* now are. The origin of the action of the young cuckoo could no more have been merely automatic or reflex action than the above actions of the thrushes, and crows, and gulls; seeing that it must—since the species flourished—have come into use precisely so as nearly to synchronise with actions on the part of the old ones—which on no theory whatever could you call *instinctive*, any more than the habit of the thrush in carrying snails to stones to break the shell, or the flying up of crows and gulls to drop shell-fish on rocks or stones to crack the shells. If this act in its beginning had not synchronised with the precedent acts of the elders, the cuckoos would, probably, have been extinct. So that here, not only have you a definite act, to all appearance possible only to reason and traversing one of the strongest and most prevailing of all instincts, but corresponding acts on the part of the young birds, without which the antecedent acts of the adults would have wholly failed and could not have been effective for their end. Here is a case of effort scarcely ever failing by a whole class directed to secure a most definite end—or couple of ends—self-preservation first and the perpetuation of the species afterwards—which certainly could not have originated in the process Mr. Darwin holds by—"*through the selection of self-originating tricks.*" Mr. Grant Allen at one place italicises these words as giving in brief the main origin of instinct in wild

creatures; and I should be exceedingly glad to know from him, if under this he includes the throwing out of the proper nestlings by the young cuckoos or excepts it, placing it among efforts of intelligence; and, after he has given his answer definite and clear I shall, perhaps, have a further question or two to put to him, if he will kindly allow me.

We are, meanwhile, in absolute agreement with Professor St. George Mivart, who writes in his essay on instinct:

"It is plain that actions may be instinctive in one animal and not in another, or at one period of life in the same animal and not at another."

And we agree with him that the pretending to be hurt, and fluttering about as though helpless and even feigning death on the part of many birds and insects, cannot be explained satisfactorily either on the ground of instinct or of inherited habit any more than certain purposive actions in insect-neuters that do not propagate can be fairly so explained.

Instinct, as used to cover or to account for certain changes and adaptations in the lower creatures, is utterly inept and, what is worse, directly misleading. Take, for example, the case of the baya bird of India which hangs its pendulous dwelling from a projecting bough, twisting it with grass into a form somewhat resembling a bottle with a prolonged neck, the entrance being inverted so as to baffle the approaches of its enemies, the tree-snakes and other reptiles; and, yet more than that, in view of other enemies, inserts fire-flies in the clay about it to warn them off. Or, further and more striking still, the case of some of the South African weaver-birds, the taha, and

others, which, having been much persecuted by tree-climbing snakes taking their eggs from an open nest on a tree as with the baya bird, fell to building a nest, hung by a kind of long fibres from an aloe leaf from a bough overhanging a stream, and within a foot of it, and now so constructed the nest that it had to be entered from below; the nest really being at the far-end of a short passage, and so balanced that the eggs and young would only weigh it enough to make it hang really even—that is, before they come, the opening or mouth of the nest drooping at a kind of slant, and when they do come it hangs even or almost even.

We have nests in so far of the same general character in the case of the *Sitarya ocularis* of Bathurst, of which there is a fine specimen presented to the South Kensington Museum by Dr. Rendall, and yet another, the nest of the weaver-bird of Uganda; or another still, in the very variable suspended bottle-nest of the grey warbler of New Zealand, as figured in Sir W. L. Buller's handbook.

A further and most striking instance is that of the *Leipoa ocellata* of Australia, which systematically places its eggs to be hatched by heat of fermentation in the centre of a vast mound of leaves, and mould, and dust, yards square—the young ones forcing their way out of the mound when hatched, without the least help from the parents. Mr. John Gould has given full descriptions of this bird and its habits in Introduction to *Birds of Australia*, lxxiii, where drawings of the mound and nest are also presented. There is here the same correspondence between the nest-building of the parents and the instinct given to

the young to force their way out, as in the young cuckoos turning out the true young, to carry forward the old one's deposition of eggs. Judging from analogy, in none of these cases was this the first and original nest of the bird; but a nest that was at a definite point hit on by these various species, to meet enemies and to overcome difficulties that threatened the very existence of the species. The truth is, all these ingenious and resourceful nests are but proofs of a process of high differentiation.

Now, here you have something in which instinct, however strong and however strange, could not, at first, at all events, have aided these creatures. Once these ingenious hang nests and mound nests were made, of course, and had continued to be made for generations, the making of them would in so far pass into something more of mere hereditary gift, but certainly not that solely or absolutely. The species that had individuals who could show such power of invention, resource, and reasoning, in the process of adapting structure of nests to needs due to changed conditions; and besides that, in the case of the Leipoa, had made veritable heat do the work of sitting, so as to defy the powers and resources of enemies threatening actually the existence of the species, had within them, latent, the same powers, still to be educed again in circumstances equally threatening the existence of the class. The moment (and it is inevitably the thing of one moment) of the passage from an ordinary twig or branch-supported nest in a tree, to a hang nest over the water, with an object, is a moment that celebrates a splendid act of reason.

The eggs of the *Leipoa ocellata*, again, are so fine

and brittle, that, very possibly, if they had continued to be brooded, the species would have suffered through eggs broken and wasted in the effort of the brooding bird to turn them over—as partially, at all events, brooded eggs must be, to get any approach to equal heat at all parts from the sitting bird's body. In the mound the heat is equalised all over, or reaches a near approach to this; so that you have the problem either (1) of eggs too brittle for brooding and exposition in an open nest; or (2), the problem of eggs having become so because for ages the birds have exposed them to the mound heat, and not sat upon them. Which is it? Mr. Grant Allen does not bring us much help, when in his "In Nature's Workshop," in *The Strand Magazine*, 1899, he said, clearly believing that mound-birds were found *only* in Australia, that here we have an early form of bird that had "not advanced beyond the crocodilian level" of leaving its eggs in the sand to be hatched by heat!

But, in our idea, indeed, it is in the study of such adaptations and variations that the real attraction of natural history lies to the true student, redeeming it constantly from anything like a vast and dry knowledge of dead things, of mere stuffed specimens, which are of real value simply as they may directly or indirectly aid this.

So precisely it is, in our idea, with the cuckoos—no *instinct* could at first have led the bird to drop its egg into another bird's nest—that was contrary to its instinct which was to lay its egg in a nest that it had built in a place that it had selected and prepared; and the birds that had done so would, it is to be inferred, accomplish as great a change again were they

threatened from other and very different causes with extinction. This is exactly in the line of Mr. Darwin's own "survival of the fittest;" but the "fittest" precisely by the possession of an order of powers that at the right moment come into play and lift it clean above its own earlier dominating *instincts*, strictly viewed. The same thing might in many ways be shown in the case of swallows and house-martins, as we have already dwelt upon them.

Dr. Russel Wallace, after a survey of such facts as these, decides, and we are not surprised at the decision, that "The mental qualities exhibited by birds in the construction of their nests are the same in kind as those manifested by mankind in the formation of their dwellings."

Of course, it has been well pointed out by Dr. St. George Mivart and others that "survival of the fittest" from one point of view means nothing—means only "survival of those that survive"—here we have something that puts a meaning into the phrase, when we find that new or latent powers have been called into play to promote the continuance, well-being and increase of the species.

Dr. Russel Wallace gave some excellent arguments from the wise and skilful adaptations of birds to changes in the materials and structure of men's houses as, for example, the changes resorted to in England at a definite time by the swallows on the adoption of brick or stone houses, instead of wood that had been held by for centuries, as well as from their stupidity and failures; and here he had to say that in these cases it was failure not of instinct but of reasoning power. Darwin's disciples are great

guessers—they are full of "probablys," "might be's," "may be's," "must be's," and so on, and don't draw distinctions they easily might do, were they not preoccupied and prejudiced, in the old fashioned and less unworthy sense of it.

Darwin himself is not guiltless of the same ill tendency as his imitators have cultivated to so dangerous an extent, as when he writes, at p. 210, *Origin of Species* (6th edition): "The act of pointing *probably is* as many have thought, only the exaggerated pause of an animal preparing to spring on its prey." The "probably is," and the "many have thought," are really very characteristic here. The "probably is," so naively backed up with the loose "thinking" or supposing of the "many," that really from our great observer and man of science and evolutionist, it is, as Artemus the witty says, *a darn site too much* in the way of supposition—supposition by supposition, and put down as if it might blossom into scientific fact itself.

XXIV.

Is then the doctrine of "survival of the fittest" to be regarded as illustrated in cuckoos that reduced the size of their eggs by one means or another? I, for one, can hardly think it. First of all, it is clear—clear as noonday—that the process was gradual; very gradual. The cuckoos in these early days, while still laying larger eggs, survived; else we should not have such large families of them now. They survived, and since a beginning must have been made in laying eggs in other birds' nests, and they suc-

ceded so well, it seems almost a waste of means to proceed as far as they have done in reducing the size of the eggs. It seems indeed a waste, and worse, unless the Darwinians will admit that, by the more elaborate process, they have done *more than survive* —that is, have gained some additional element of enjoyment, ease or leisure. It does not seem that this is the case with our cuckoos *(canorus)*; they are more pressed and put to it than almost any other bird, and have sacrificed wholly that joy of brooding, which seems the one taste of heaven for most other birds, and also strictly the joys of true courtship and mating. Besides, other cuckoos, and some of them of larger make, succeed equally well, though their eggs remain the natural size, or size proportioned to that of the bird. And what, if in the severe process of nature in modifying the oviduct, and, indeed, the whole system, especially of the female bird —robbing her of the joys of true mating, brooding, etc.—you have the explanation of the great disproportion in number of the sexes that we see in our common cuckoos now, so very marked and extraordinary, that, instead of mating, there is promiscuity; instead of sequential seasonal companionship, there is polyandry; and, instead of brooding and rearing young, sheer parasitism and imposture. Survival of the fittest! Well, yes, but here it lands you in a quandary. The males have *more survived* than the females, who most deserved to survive, as having undergone the greatest functional change in order of it. At least in the proportion of four to one, on my lowest reckoning, from observations made; of seven to one on my highest: so that your "survival of the

fittest," if it is to proceed along the same course as it has already done, will at last end, mark you, in no survival at all—female cuckoos of our common species will have died out. Will that then be claimed by you as the final victory of your survival of the fittest, when even the fittest, under stress of the application of your own principles, have vanished — vanished utterly? If the fittest of one species that alone survive are males, then you logically prove your case; biologically, where are you? You need, surely, very much to mend your definitions or your premises somehow! The ragnarok of the cuckoos—the last band of the migrating males—come to this country for no purpose, or worse than no purpose, unaccompanied with females, and doomed to wander over earth without "an object or an aim," will be the final proof that, after all, "survival of the fittest" universally obtains, though whole races are without the fittest or the fit, despite that they have shown such resources, put such a strain on themselves in departing from normal principles of nature, that they died—died, mark you—by the very efforts which, according to you, if you have any basis at all, should have made them survive and increase! Where the "fittest" are all males, or gradually tend to be, you have surely reached the *reductio ad absurdum* of your theory, by proving the fittest, after all, the unfit.

If the males have had no share whatever in the efforts that have led to the lessening of the egg, or to the colouring of it, and if "the remarkable instinct which leads some species of cuckoos and crow blackbirds* to lay their eggs in the nests of other species

* "Crow" is distinctly printed by Dr. Brooks here, but, of course, it should be *cow*-blackbirds.

must have originated in the females,"* as one pronounced American follower and illustrator of Mr. Darwin's doctrines has asserted, have we not in these arguments an additional ground for adhering to our position indicated above that the fit go down and the unfit survive?

Nor can aid be got here by any suggestion that increase of males over females is due to thickness of eggshell, since the same will hold of that—the female producing it—and thus the fit, by their very fitness, are made contributory to their own decrease or extinction, or a kind of involuntary, but not the less a real "natural selection," if unintentional, suicide!!

Dr. Brooks in his "Law of Heredity," though in some respects a very decided follower of Darwin, after no end of experiments with animals in interbreeding, and comparison of his results with those of others, reaches the general conclusion "that there is beyond and behind the action of 'selection,' some more deeply seated law, which determines that the males, shall as a rule be more modified than the females."† Now, it seems to us that our common cuckoo gives something which is not quite consonant with this: and we should be much obliged, should this writing ever reach the eye of Dr. Brooks, if he would give us his views on it. From what is seen above, certainly it is the fact that the female cuckoos undergo more modification in internal organ, and as a result, in functional activity than do the males, if it may be true that the males are more modified in mere outward aspect in view of certain necessities. It is

* Brooks's *Heredity*, p. 241.

† p. 218.

open to Dr. Brooks to say that this is an exceptional case wholly; but we did not understand his expression above to apply to whole species as exceptions, but only to individuals or groups of individuals within the species; and certainly as to cuckoos Dr. Brooks has himself in more than one point suggested this as regards the species; yet, certainly in this case, the species as regards females show more of real and inward modification than the males. Can this possibly be a reason why the females decrease at such a rate or the males increase so rapidly; and how does it stand in relation to Dr. Brooks' generalization given above?

XXV.

Mr. Romanes writes: "From the first Darwin invited criticism to adduce a single instance, either in the vegetable or animal kingdom, of a structure or an instinct which should unquestionably be proved to be of exclusive use (or benefit) to any species other than the one presenting it. *He even went so far as to say that if any one instance could be shown he would surrender his whole theory on the strength of it.* . . . .

"Now, as this invitation has been before the world for so many years, and has not yet been answered by any naturalist, we may by this time be pretty confident that it never will be answered. How tremendous, then, is the significance of this fact in its testimony to Darwin's theory. . . . Therefore, I say, that this immensely large and general fact speaks with literally immeasureable force in favour of natural selection, as

at all events one of the main causes of organic evolution." *

Now, with the fact clear in our minds of the quandary in which Mr. Romanes found himself when he proposed the question, why Nature had not armed the small birds with counter-instincts as against that "strange and cruel instinct" of the cuckoo; and was, poor man, compelled to the flimsy, and ill-founded consolation that nature had not done so, because "comparatively, the deposition of a cuckoo's egg was so exceedingly rare an event" that she had not deemed it worth her while to call in there a counteracting instinct. Mr. Romanes certainly could not have had that fact in mind when he wrote as above in "Darwin and after Darwin." The case of the gullible and gulled little birds by the cuckoo is absolutely a case where an instinct—Mr. Darwin would call it "a misleading instinct"—actually makes for the absolute benefit of another species and not only that, but to the absolute destruction of the bird's own progeny and risk of extinction of the species. "Nature had not called in there," says Mr. Romanes, "a counter instinct;" that is, had left the poor little birds with no instinct other than to serve the purposes of the cuckoo—an instinct not counter to that of the cuckoo, as Mr. Romanes put it, not nearly so adroitly as he might. From first to last, here is a case, where the instinct of the little birds not only benefits and is of use to the cuckoo, and is systematically used by it, but in the process their own progeny are ruthlessly sacrificed; as Goethe says, forcibly, from half-a-dozen to a dozen singing birds sacrificed for one cuckoo; for

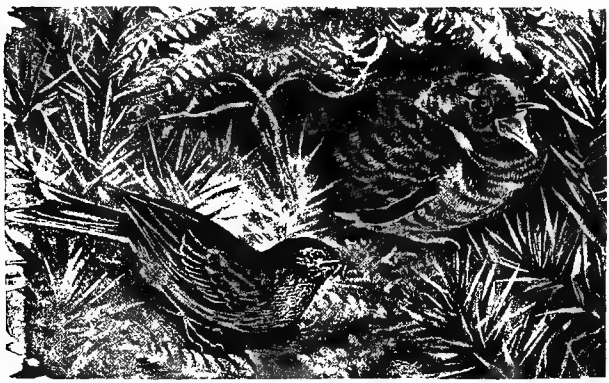
* *Darwin and after Darwin*, pp. 286-7.

the feeding of the aliens prevents a second brood. The instinct in these little birds unquestionably proves to be of exclusive use and benefit for another species —the cuckoos.

Mr. John Hancock tells that, in the course of his watching the young cuckoo turn out eggs and young of the foster-parents, the hen hedge-sparrow actually sat on the edge of the nest and *unconcernedly* saw one of its own young sent over the side—a thing so counter to the common instinct that we can only assume a yet stronger instinct there brought into play—an instinct of which we can give no explanation—only clearly it is there. Mr. John Craig remarks precisely to the same effect. We should indeed be glad if Dr. Russel Wallace could give such an explanation as we desire here.

Mr. Tom Speedy tells (*Craigmillar*, p. 197) of a young cuckoo which was found by a gentleman, and taken home to form a pet. It was so voracious that he would have needed to give his whole time to hunt for insects, etc., for it. It was never satisfied. To get rid of it, he gave it to Mr. Dewar, naturalist, Edinburgh, who kept it on make-shift diet for a fortnight, when an enthusiastic lady naturalist, Mrs. Hoyes, of Skelmorlie, asked for it. She put the cuckoo into a large aviary, as she tells, where "among many other birds, were American blue robins." She was surprised, when feeding it with meal worms, and accidentally dropping one, to see a little blue robin pick it up, and at once pop it into the cuckoo's mouth. She subsequently observed that the same bird fed it regularly, and showed fight to any other bird that dared to come near it. "Instances have

occasionally been recorded," Mr. Speedy goes on, "*of foster-mothers of cuckoos, in their wild state, starving themselves to death in their devotion to supply their gluttonous charge with food, when immediately a bird, sometimes of another species, would commence to provide for the young bird.*" These statements have naturally been accepted with reserve, but the case in point affords some corroboration of their accuracy.



YOUNG CUCKOO IN MEADOW-PIPIT'S NEST.

Mrs. Hoyes wrote:

"I don't know when I felt the loss of a pet more than I do the dear devoted blue nurse, which we found dead this morning. I do most thoroughly believe that the poor wee bird starved itself to death in trying to keep the cuckoo satisfied with food. I have seen it pick up three meal worms at once, when I threw it about a dozen, in the hope it might take

one for itself; but no, every one he scrambled for, went down the cuckoo's throat, never apparently swallowing one himself. Strange to say, one of the Cardinals (Pope, South America) has taken charge of the cuckoo, and is feeding it well." "Eventually," added Mr. Speedy, "it picked up its food for itself, and up till the end of October seemed to thrive, but on the night of the 30th of that month several degrees of frost were encountered, and the following morning the lady wrote, 'I saw at once he was doomed, but his end was so gentle that he really seemed to sleep away.'"

Dr. Russel Wallace's doctrine, that arguments from creatures under artificial conditions are not absolute as regards the same creatures in wild nature, may here apply, but assuredly this present case has the strictest analogy in "wild nature." I had opportunity of watching a wren engaged in the hard task of feeding a young cuckoo. The cock bird not putting in an appearance, I supposed it had met with a mishap and been killed. The wren was actually starved by the efforts to satisfy the young cuckoo, and one morning, when happily I was observing, fell off the branch of a maple tree, dead—the stomach quite empty. Before very long (within three-quarters of an hour), the cries of the young cuckoo, which were incessant, very loud, and pitiful, brought a couple of meadow-pipits, who took on themselves the hard and ungrateful business of feeding the youngster.

More than this, the above instance, given by Mr. Tom Speedy, supplemented by observations of my own, suffice to show that birds of various species

sacrifice themselves, even to death itself, for the young cuckoo, in such a manner as they are not required to do for their own offspring. And even when they survive the demands made upon them in feeding such a monster, late broods are made impossible, and this must have, on all analogy, a detrimental influence on the sexual organs. The instinct of these birds in this direction is therefore unmistakeably one that is from first to last only injurious to themselves; consequently destructive to them as a species, whilst to the cuckoo it is absolutely and entirely beneficial. Cases on cases might be cited here to prove that, not only do the small birds sacrifice themselves for the cuckoos, but actually compete with each other for the "privilege." As we correct this proof we read in *The Daily Telegraph* the letter of a correspondent:

"By the side of a farmhouse at Headcorn (Kent) a strange sight may be seen. Some time ago a young cuckoo was found in a lark's nest, and placed in a rabbit hutch. It was carefully fed by hand until a little wren was seen to pay periodical visits to the place, and feed the big cuckoo through the wire. The tiny bird still nourishes its big adopted child, and a more comical sight it would be hard to imagine than the large cuckoo flapping its wings with joy and opening its extensive beak to receive the food its 'little mother' drops into it."

Really, were it not for their great names, such reasoning as that of Mr. Darwin and Mr. Romanes on this matter—such ignorance, or ignoring of patent facts, and the going on, going on with fine words, as Mr. Romanes does above, in favour of a mere theory,

would not be worth a moment's attention—not to say analysis and counter-argument. We said at the outset of this section that Mr. Darwin found the cuckoo one of the most difficult creatures he had to tackle; and we think we have proved it, and deserve the prize Mr. Darwin and Mr. Romanes were prepared to give to the man that would present a case where the instinct of one species is unquestionably proved to be of exclusive use to a species other than the one presenting it. But sometimes people are not grateful for having their demands supplied. We look for no reward, beyond the gratification of having done the work. Most assuredly this instinct is not in favour of the hedge-sparrow, wagtail, meadow-pipit, etc., etc., while it is as certainly in favour of the cuckoo. Mr. Romanes refers to cases "where a structure or an instinct is of primary benefit to its possessor, and then becomes of secondary benefit to some other species, on account of the latter being able in some way or other to utilise its action." But this most certainly cannot apply to the cuckoo and her victims —the primary and secondary benefit as well is all the cuckoo's, and benefit is *nil* for the victimised little birds, in the sense of use or benefit Mr. Darwin and Mr. Romanes can intend or imply; and I shall look most eagerly for the explanations and glosses their friends, followers, apologists, and defenders will be able to put on this fact. I do trust they will be more scientific than poor Mr. Romanes' effort—wonderful effort of ingenuity—to account for no counter-instinct being implanted by Nature in the little birds, as against the cuckoo, because the deposition of a cuckoo's egg was "comparatively so exceedingly rare

an event" that Nature had not thought it worth while to do anything! After that, the friends and followers of Mr. Romanes may not find it so very difficult to follow him.

Were I here to go into other cases, I might cite the instinct of curiosity about ant-lion holes on the part of certain ants, which seems to me to be all in favour of the ant-lions, and not at all in favour of the ants.

In fact, the whole realm of parasitism, alike in flowers and plants, in insects and in birds, presents an almost unexampled unexceptional argument against Darwinism, and a complete answer to Mr. Romanes' challenge. We read:

"The social Hymenoptera—ants, bees, wasps—well provided with weapons as they are, neither have the sense to exterminate their enemies, nor do they seem even to recognise them. In the presence of their habitual parasites, these insects, in other respects so sagacious, seem to be struck blind." *

Surely here we have an instinct which actually becomes protective, passively if not actively, and which is in favour absolutely of the protected species, and has no benefit or compensation from the protected for those which protect.

Then there is the *sacculina* and the crab, which, by the presence of sacculina, is rendered sterile—utterly sterile, whether male or female. In the female where the tail is segmented and flexible, that tail, which had hitherto protected its own eggs, now protects only the *sacculina*, while in the male the tail (which is normally segmented without being really

* *Massart*, p. 71.

flexible) becomes exactly like that of the female. No man will surely deny that here is a case where an accommodating instinct, passive if not active, in the preyed upon becomes absolutely of benefit to the parasitic species, and of loss and injury only both to the individual and to the species protecting. Here are structures which become essentially modified in favour of an alien parasitic species — just as the parental instinct in victims of cuckoo become modified—and one effect of that change of structure is sterility in both male and female, where instinct of protection has been assenting and is a cause. The delicacy and susceptibility of the generative organs to which Darwin at last awakened are testified by such vast changes as this as well as by those he noticed and dwelt on.

In other cases, as well in plants as in animals, there are nothing short of voluntary (we can use no other word) self-adaptations to the entertainment of the parasite.

There are certain blind beetles *(Staphylinidæ)* found in anthills living at the expense of the ant community, and, so far as can be ascertained, yield no service or benefit whatever to the ants in return. The instinct of the ants, which tolerates and leads them even to protect the beetles, is surely an instinct entirely in favour of the beetles, and of no service to the ants.

"Although the fact is not yet proved," says Van Beneden, "it is at any rate very likely that at an earlier period there had subsisted between these species and the ants some kind of mutualist relation analogous to that which still exists between ants and

aphides. Little by little this relation has ceased, until the animals found in anthills to-day have become traditional parasites, tolerated through the inertia of custom on account of the services formerly rendered by their ancestors." *

This is a very good speculative guess instead of a satisfactory explanation; and if it is not well-found, it is, at all events, suggestive of how close, according to Professor Van Beneden, is insect parasitism to the inert outstanding cases of filthy human parasitism—such, for instance, as the "bearers of the king's stools" in pre-revolutionary France, and the existence, up to a certain day when it was commuted for nigh £20,000, of a master of the falcons in England and to-day of a master of the buckhounds. How near human nature runs to insect and other nature! Here the perverted instinct of Englishmen leads them not only to tolerate parasites, but to bow down before them as the Egyptians of old before the dung-beetle!

In the case of the little birds and cuckoos we have had brought before us in the actions of the former what is decisively in the teeth of pre-Darwinian theory as of the Darwinian. Thus Dr. Roget put it that "the individual and the species were preserved not by slow and uncertain calculations of prudence, but by innate faculties, prompted by an unerring impulse to the performance of the actions required for those ends." † It is something to find an instance and argument that equally runs directly counter to both! But, on this reasoning, the inevitable act of the small

* *Animal Parasitism*, p. 117.

† *Bridgwater Treatise*, ii, p. 514.

bird, should invariably be to turn out, build over, or puncture the cuckoo's egg to prevent hatching, and one or other of the victimised little birds could unfailingly do so, as some among them now do.

And finally, we ask, and ask seriously, how this bears on what is called the "survival of the fittest" —the little birds that will *most successfully* bear the heavy tax of feeding the big, gutsy cuckoo for so long a period, are, speaking reasonably, those that would most successfully have reared their own young: and, being healthy, strong and enduring, have had strong, healthy progeny—the "fittest" in view of the general qualities of their own species. A clear and explicit answer to this argument will oblige. But, indeed, Mr. Darwin himself anticipated the ground on which we here stand. "Many instincts," he says, "are so wonderful that this development will probably appear to the reader a difficulty sufficient to overcome my whole theory."*

These extraordinary powers in the young monster, the alien intruded cuckoo, on which we dwelt in the earlier part, seem to work on the victimised adult birds, many of them, with something like fascination. They actually lose all sense of protective duty towards their own young in an admiring wonder of this overgrown, greedy glutton, and, when all the legitimate progeny have gone, they devote themselves to feeding and attending to him with what seems a sense of profound pride and joy.

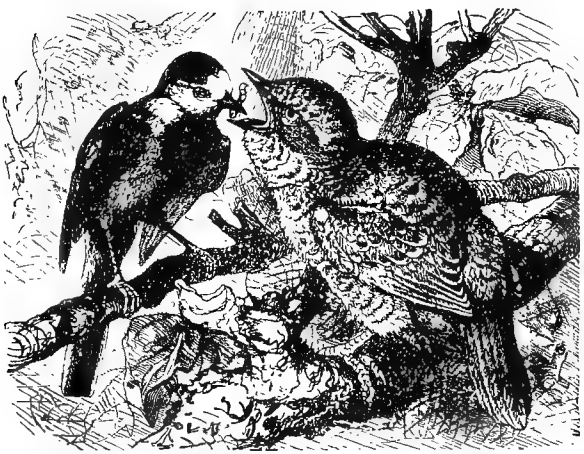
Here we refer once again (for it demands reiteration

* *Origin of Species*, p. 205.

for its vast importance), to the utter indifference with which the hen hedge-sparrow, as Mr. John Hancock so circumstantially tells, sat and saw one of her own progeny edged over the side of the nest by the young cuckoo. Mr. John Craig notes precisely the same thing. This shows such an extraordinary departure from all that we have hitherto regarded as parental instinct in birds and highly developed mammals alike, that it is not hard for us to believe that in some cases the passive procedure under such an outrage may become active, and that as Jenner said long ago, the foster-parents may "themselves sometimes turn out unhatched eggs from the nest after the young cuckoo is hatched."

One extraordinary element in the matter is, that this big and unwieldly nestling, which had shown such unexampled powers in throwing out eggs and young from the nest when but a few days old, becomes, in a sense, the more dependent and helpless as he outgrows the nest, and when he has found strength to leave it, keeps up an endless demand on the victimised birds for weeks: so that they are hindered from breeding again, when they otherwise would certainly do so. Thus you have not only one ordinary instinct or two overborne and superseded by what seem unnatural and extraordinary instincts, but here is another. If in the victimised birds this latter instinct was not overcome, the young cuckoo would even then fall a victim to hunger: if the parent victimised birds returned on their true instinct, the real end of all the cuckoo's endeavours would be defeated—the young would not survive. But that through such a long period you should find birds of

many kinds voluntarily acting thus right in the teeth of all we should call ordinary or primary instincts in them is really surpassing strange: and no explanation I have as yet read exactly supplies at every point what is demanded. Certainly, as we have seen, the explanations of Mr. Darwin and Mr. Romanes are not



WAGTAIL FEEDING YOUNG CUCKOO.

only unsatisfactory, but most inefficient, feeble, inept, and even ignorant and misleading, since even a faithful purview of the facts was not attained by either.

Since in one end of the room in which I wrote I had my aviary, I was able to notice some things which may not be generally noticed. Among half-a-dozen or more canaries I had a hen linnet, a cock goldfinch, and a cock mule. These, even when

breeding was going on with the canaries, had their free fly about all day, and agreed well with the canaries—the hen linnet, unpaired, especially taking a vast deal of interest in the sitting and in the young ones when they came. But the point on which I mean to dwell is this, that these young birds, the very day after their eyes were open, knew unhesitatingly whenever either of these three birds went near the nest where they were, that they were not their father or mother, and drew down their heads with surprising celerity; whereas, when father or mother came, they set up their heads to be fed. Now, as the goldfinch mule was not so strikingly unlike the spangled or lizard canary cock, this decision in recognition surprised me, and that from the very first, and the thing never altered so long as the birds were in the nest; though, after flight, they showed no particular aversion to either of the three birds, and were indeed very friendly with the hen linnet—the unlikest to them of all. If observation should prove that this is generally the case, then the apparent inability of certain wild birds to detect the difference between their own progeny and the young cuckoo is all the more wonderful, and, in fact, "out of nature."

XXVI.

Since Mr. Darwin, indeed naturalists have become all too fond of "may be's"—which as we Scotch school boys were wont to say are not good honey bees. The determination, for example, of these parrots in New Zealand, called keas, to sheep—killing and blood-

sucking, is a little hard to justify from certain points of view of theory; but certain good folks must find ways to explain it by "may be's." Thus Dr. H. Woodward, quoted by Prof. St. George Mivart, suggests that these keas in former days *may have fed* upon a species of *dinornis*, perching on their backs as they do now on the backs of the sheep"*—a suggestion for which, so far as we are aware, there is not the least ground in any known fact whatever. Dr. H. Woodward only boldly *imagines* it. So far as we know there is not, as said above, a single fact in favour of this presumption. We have facts that justify us in tracing a certain process in the transference of frugivorous parrots into sheep destroyers.

1. The Darwinians say that the keas found offal and entrails of sheep thrown about and skins hung out, and pecking these over hit on what they came to regard as tit-bits. This is not the case, and is denied by Mr. Taylor White, Mr. Huddlestone, and others.

2. The keas do not eat flesh of sheep at all, and certainly not dead flesh, but suck the blood of the living sheep, leaving torn carcases behind them.

3. The next step clearly was by conference to decide what was the most effective means of securing these tit-bits from the living sheep, and the agreement was that united effort by bands was the most likely process, which the said practical experience of New Zealand farmers shows it was.

4. Has Dr. Woodward anything to favour the idea that the *dinornis* was specially fed up, and fattened?

* St. George Mivart's *Birds: Elements of Ornithology*. Keas *ad loco*.

If not, the analogy fails, and fails wholly on the most important point.

This confirmed habit of "probably it was," "it may be," "it might be," "it *must* be," and so on, with Darwin and his followers—the reading is always of the subjective notion into the fact—is precisely what gives Professor St. George Mivart his strong points against the Darwinians, especially in his very bold and original "Origin of Human Reason."

PART IV.

EVIDENCE FROM ALL PARTS OF THE WORLD.

THE FACTS AND COMPARATIVE SURVEY WHOLLY AGAINST DARWIN AND THE EVOLUTIONISTS.

XXVII.

THE SPANISH EVIDENCE.

FROM the facts already given it will be seen that verified observations in different countries show that there can be no manner of doubt cuckoo's eggs do vary within a certain range; and there are facts connected with varieties of the cuckoo family which are strangers to our island, or very rarely seen there, such as add new force to this position.

Take first the great spotted cuckoo (*Coccystes glandarius*), only two of which have, in 1849 and 1870, been found brooding in this country. Its eggs so clearly resemble those of the pies (*Pica mauritanica* and *Cyanopica cooki*), in the nests of which they are found, that even expert zoologists have been deceived by them, only to discover the truth when the cuckoo's embryo has been extracted from the supposed pie's egg.

The great spotted cuckoo in Spain was so far very carefully observed by Lord Lilford. He tells us that he more than once found three eggs of the cuckoo in one nest, with four or five of those of the magpie, and that once he actually met with eight cuckoo's eggs to five of the magpie. He also makes the very significant statement that the eggs of the cuckoo in all these cases were more advanced towards hatching than those of the magpie. He only once, he says, found there a cuckoo's egg in a raven's nest.* Now,

* Lord Lilford's actual words are:

"The greatest number of cuckoo's eggs found by us in any one nest was eight, with five of the magpie." It is almost in-

what a pity it was that Lord Lilford failed to watch the later results there.

That the cuckoo's eggs, *i.e.*, in these cases, were invariably more advanced towards hatching than the magpie's shows wonderful adaptation in one respect; for the young cuckoos, which grow very fast, coming first, would have an easy business of throwing out the young magpies as they were hatched. But this repeated finding of three eggs in one nest, and in one case as many as eight to five of the magpie, suggests a question that has often been asked. Do the young cuckoos distinguish in favour of their own kind, and abstain the one from trying to turn the other out? Do they combine in action against the rightful occupants of the nest, or do they not? and, if so, how does the matter end? Do the young cuckoos fight it out, one against another, till the strongest only is left, or are they armed with a special instinct against warring upon each other? The rare cases in which two cuckoo's eggs have been found in the same nest in England has suggested the question. Lord Lilford's report emphasizes it. We wish some naturalist in Spain would carefully investigate the matter, and let us know; for we are all the more curious that Lord Lilford has, to our grief, passed beyond our asking of him for further light on this special point—on which light is, indeed, very much wanted, as on so many others connected with the cuckoo. If all the

credible that the pies should bear this wholesale victimization, unless, indeed, the cuckoos took out eggs for those they put in. Manuel de la Torre, the royal keeper at Madrid, knew of instances where as many as four eggs of the cuckoo had been found in one magpie's nest.

eight cuckoos were hatched, how could the pies possibly have fed so many ravenous young ones—the young cuckoos being almost insatiable in their demands for food—even one causing a heavy tax on hedge-sparrows, and wagtails, and pipits?

XXVIII.

NEW ZEALAND EVIDENCE.

THE evidence from other places, and more especially from New Zealand, over large spaces of which we have a temperature and climate not so very different from our own, may help to throw a little light on some points. There are two cuckoos in New Zealand which are distinctly parasitic, but in very different degrees and by different methods. We may accept the fullest and most trustworthy account of these:

Sir W. L. Buller, in his able and beautiful book on the *Birds of New Zealand*, tells of the long-tailed cuckoo there—how it comes from the warm islands of the South Pacific, stays the summer, and breeds in New Zealand; how it is parasitic chiefly, if not exclusively, on the grey warbler (*Gerygone flaviventris*); how the young are fed and nourished by these small birds. It has been found by him at Otaho (in the north island) as late as the first week in April—coming in the end of September or beginning of October. It is a confirmed egg-eater—more especially of the eggs of the tui, or parson-bird, and these birds, whenever they see this cuckoo, mob it, and follow and persecute it. Sir W. Buller, from various cir-

cumstances, believes that the bird incubates its egg or eggs, but leaves its young to be fed by other birds, who take care of and feed the youngsters, moved by their piteous cries. He does not believe that the cuckoo could possibly deposit the egg in certain nests, which, by the way, he holds, could not support the weight of the young cuckoo if they did the egg, which is large and heavy, and certainly his idea is that these small birds could never hatch it: it is about 1·25 by 1·15. One peculiar point is that young birds are frequently met with in the end of March or later, but it seems probable that these are only solitary individuals hatched too late to permit of their joining in the return migration.

The shining cuckoo, he tells, acts somewhat differently from the long-tailed cuckoo as to breeding, etc., and it is a very much smaller bird—the victim in its case also being generally the grey warbler; but its egg is much smaller than the other, only ·8 of an inch in length by ·5 in breadth, and, in this case as with ours, the true progeny are ejected by the young cuckoo.

The Rev. R. Taylor tells that he discovered the nest of a grey warbler in his garden shrubbery, containing several eggs, and among them a large white one, which he correctly assigned to the shining cuckoo.

"In due time all the eggs were hatched; but after the lapse of a day or two, the young cuckoo was the sole tenant of the nest, and the dead bodies of the others were found lying on the ground below. At length the usurper left the nest, and for many days after both of the foster-parents were incessantly on the wing from morning till night, catering for their

charge, whose constant piping cry served only to stimulate their activity."

Sir W. Buller adds (p. 29) that an egg of this cuckoo, taken years ago from a grey warbler's nest by himself in the Maruka scrub, was of a pale creamy colour, and "another, which was laid by a captive bird in my possession, is pure white."

Now, here the question arises, how has the shining cuckoo come to be so much smaller, and to have an egg so much smaller than its relative, the long-tailed cuckoo? Is the latter only on the way, by a small instalment, to the point which the shining cuckoo has secured, or what? Has the shining cuckoo outstripped its congeners in the race because of more cleverness, adaptability, or what? Or has the long tailed cuckoo, more astute than he seems, discovered a short cut, and finding that by it he can fully secure his object, does not need nor want to go any further. If certain little birds can be found—as indeed we have some grounds for thinking is the case with certain of them in this country—ready to nurse and feed the young cuckoo, though they have not brooded him, then does it not seem rather a waste of energy and knowledge that our cuckoos have not taken more advantage of it, and caused themselves all the effort and pain which cannot but have been associated with the process, gradual and long continued, by which the egg was reduced from normal size to the size we now find it?

The egg-eating on the part of the long-tailed cuckoo and his being mobbed by little birds as the cuckoos are in this country, anew and from another point, emphasizes the question whether at a certain stage in

this country the cuckoos may not have been egg-eating on a large scale, as they are now on a more limited one; the mobbing by small birds in return for that injury remaining a witness of it.

In New Zealand, too, there are instances of what are called belated young birds not being able, for one reason or another, to join in the migration.

Here then, in the long-tailed New Zealand cuckoos, we have an exact connecting link between the American cuckoos and ours—a species which broods its own eggs, but having done so, casts the young on the care of others to be fed and tended. By this, the perpetuation of the species seems to be just as fully secured as by the more thoroughgoing tactics of *Cuculus canorus*. But if so, *Cuculus canorus* takes on himself, and has for long ages taken on himself, more labour and effort, outside what we may call the line of instinctive action, than is really necessary to secure his end. Or is it, then, that those cuckoos which have stopped short of the complete parasitism of *canorus*, are but yet on the way towards the point of perfection and completeness to which he has attained? Either this, or it must be confessed that, in his perfection and completeness, evolution is not justified of its children, because we have here a machinery, so to say, most complicated and involved—a machinery, which through its very fineness, sometimes breaks down, whereas, so far as we can learn, a less complicated machinery—less affecting habit and function—has been found to secure fully the end desired. If in *canorus* you have the survival of the fit, on account of distinctive and complete organisation and modification of function, then in the New Zealand long-tails

you have the "survival of the fittest," inasmuch as they survive, and have not undergone some (or many) of the modifications manifested in the others.

XXIX.

THE AUSTRALIAN EVIDENCE.

Mr. John Gould, in his *Birds of Australia*, gives about a dozen different varieties of the cuckoo as existing there—all of them parasitic. He says:

"All the Australian species, with the exception of the members of the genus *Centropus*, are parasitic; the huge *Scythrops*, and the diminutive *Chrysococcyx* alike depositing their eggs in the nests, and entrusting their young to the fostering care of other birds. The *Scythrops* is said sometimes to lay its egg in the nest of the piping crow (*Gymnorhina tibicen*), and I have known many instances of the eggs of *Chalcites* being deposited in the domed-shaped nest of *Maluri*."

Cacomantis pallidus is apparently nearest to our *Cuculus canorus;* and its eggs, about seven-eighths of an inch long by five-eighths broad, is of cream colour, and speckled all over with markings of brown. The egg of the monster *Scythrops Novæ-Hollandæ* is one inch and eleven-sixteenths long by one inch and a quarter broad, of a light stone colour, with irregular blotches of reddish brown, many of which were of a darker hue, and appeared as if beneath the surface of the shell. Unfortunately, Mr. Gould was not able closely to discriminate the eggs, and expressed the hope that the rising ornithologists of Australia would do it.

Has this, in more recent years, been systematically done? And is it now an absolutely settled point that the big, most magnificent, large-billed *Scythrops Novæ-Hollandæ* is parasitic with its monster eggs; and, if so, which are the birds on whom it manages to impose such an egg? Mr. Gould speaks of it, as we have seen, *positively*, at one place as parasitic; but in another he is doubtful. It is clearly ascertained, however, that this bird, though it migrates, does not migrate very far, as it had not, when Mr. Gould wrote, been seen out of Australia, nor even on the north coast of that country.* So far as migration is concerned, the same thing, according to Mr. Gould, applies to the ash-coloured cuckoo (*Cuculus cineraceus*). The shining cuckoo is the smallest of the Australian cuckoos, and mostly deposits its eggs in domed nests, with a very small hole for an entrance. The egg of this species is eleven-sixteenths of an inch long by half an inch in breadth. The brush cuckoos of Australia (*Cuculus insperatus*) are important, because, more clearly than any other variety, they unite the genus *Cuculus* with the *Chalcites*.

Now, one of the most important questions that arises is the fact of *Scythrops* being parasitic. If it is, with such an egg, what is its process, and what are the birds victimised by it? Clearly it has not yet, through any long process, reduced its egg below the

* Captain G. E. Shelley, in his exhaustive and most valuable section of the *British Museum Catalogue of Birds* (1891), gives as the area of the giant *Scythrops Novæ-Hollandæ* —"Australia, New Guinea, Duke of York Island, New Britain, Ké Islands, Bouru, Obi, Batchian, Ternâte, Ceram, Celebes, and Flores."

proportionate size; and if in spite of that, it is parasitic, and so survives, have we not here another ground for saying that the reduction in size in egg of *Canorus* is less necessary than might at first sight appear?

In so far we *have* the results of later research and observations in the *Companion to Gould's Birds*, by Mr. Sylvester Diggles. He says that the channel bell cuckoo *(Scythrops Novæ-Hollandæ)* lays its eggs in nests of other birds, and principally those of birds much smaller than itself. It is migratory, appearing in October and departing in June—eight months; so that pressure of time could have nothing to do with its parasitism.

Mr. G. J. Broinowski does not say decidedly if it is migratory and, if it is, to what extent it is so. We can but infer from his words that it is not, but resident there. He gives as its habitats—"inland portion of Australia generally," which looks to us as though it were practically resident. Certainly, it does not migrate over sea. Its note, Mr. Broinowski adds, is quite different from that of our common cuckoo.

Mr. Broinowski tells of *Cacomantis flabelliformis*, or fantailed cuckoo, that it lays but one egg in a nest of what is almost always a smaller variety of bird. It is migratory, spending the summer in Tasmania, and returning to Australia in January and February. But it is evident that if it lays but one egg, it has abundant time to brood and hatch it and attend to the young bird; so that pressure of time for migration can have nothing to do with its parasitism either.

Thus one most important thing learned from certain of the Australian cuckoos, which are as pronouncedly

parasitic as ours are, is this, that pressure as to time allowed, owing to long migration, does not exist. Certain of these birds are in the "breeding places" from the middle of September till the very end of February or the middle of March, and in some seasons they have been found in numbers there in the beginning of April, while others are there from October to June, so that, by no stretch of imagination, could Jenner's reasoning be applied to them. They are from five to six months, up even to eight months, in these "breeding places' in Australia—sometimes are resident, and again when they migrate do not migrate very far—only to some degrees northward in many cases, because insect life is then more abundant there. And just in the measure that migrating distance is reduced you have the instinct weakened as seen in what are called our own resident birds, which always tend to move with a certain constancy. Thus we have, in Australian cuckoos of parasitic habit, as presented to us by Mr. John Gould and his successors, a set of phenomena which utterly knocks on the head all Mr. Darwin's reasonings derived from Jenner, proving absolutely that a certain shortness of time can have really nothing to do with the original strong and determined instinct to parasitism in the cuckoo. The New Zealand evidence confirms it. Sir W. L. Buller tells us that both the parasitic cuckoos of New Zealand are often to be found there in the end of September or beginning of October, and are to be seen in the end of March, sometimes so late as the first week in April.

Sir W. L. Buller has conclusively identified the bronze and the shining cuckoos. They are migratory,

but are in the breeding places for six months or so. Mr. Broinowski has this very suggestive passage in one of his volumes :

"The force of hereditary instinct is never more strongly evidenced than when we find it asserting itself in some immaterial trait that has no effect upon the present, except as a mark of evolution, but clearly points back to the discarded habits of earlier races. Among the *Centropi* we found the parasitic custom unknown ; each pair made their own dome-shaped nest, and performed the task of rearing their young like any other virtuous birds. The *Eudynamis* cut itself free from all domestic obligations, and left its young to be tended by kindly crows ; thus proving that there is a wide racial gap between the two genera. The gap we may consider bridged over in the chain of evolution by the *Chrisococcyx ;* for the shining cuckoo, though a true parasite, is usually found to deposit its egg in a dome-shaped nest having a very small entrance. In New South Wales, the *Malurus cyaneus* and the *Geobasileus chrysorrhous* are forced to be foster-parents. Mr. Bennett, in writing of the *Lucidus*, states that he has found the egg in the nest of *Acanthea chrysorhiæa*, and that he has seen a nest of this bird with five eggs, that of the cuckoo being deposited in the centre of the group, so as to ensure its receiving the warmth imparted by the sitting bird, and thus less likely to be addled. He also narrates the following incident : A white shafted flycatcher (*Rhipidura albiscapa*) was shot at Ryde, near Sydney, in the act of feeding a solitary young bird in its nest, which, when examined, was found to be the chick of the bronze cuckoo of the colonists."

"The young cuckoo," he adds, "invariably kills and throws out the rightful nestlings. It is strictly migratory, reaching New Zealand between the 7th and 21st of September, and remaining as late as April, abundant time in which to hatch and rear a brood."

XXX.

THE EGYPTIAN EVIDENCE.

We have grounds yet more relative, if such are wanted, in view of our point against Mr. Darwin and Mr. Romanes and their followers. The great spotted cuckoo of Egypt is there *resident*, and yet it is purely parasitic, laying its eggs in the nest of the hooded crow, which there lays about the same time. Here it is clear, absolutely clear, that pressure due to dates of migration can have no place—can have no bearing as predisposing to the parasitic habit—the cause of which must in this case be sought elsewhere, as we believe it must be in the case of our own *canorus*. Captain Shelley is our authority, and he thus writes in his *Birds of Egypt*.

"The great spotted cuckoos *(Coccystes glandarius)* are resident in Egypt and Nubia. They are by no means shy, and will often sit motionless on a bough while one walks beneath the tree. In Egypt they breed at the same time as the hooded crow, and invariably select a nest of that species in which to deposit their eggs."* Von Heuglin (*Ornith. N.O. Africa*, p. 287) is of opinion that they first lay their

*pp. 162-3. Edition, 1872.

eggs on the ground, and then carry them in their beaks to the nest they have selected, in exactly the same manner as the common cuckoo does.

XXXI.

THE PALESTINEAN EVIDENCE.

CANON TRISTRAM, in his most valuable book, *The Birds of Palestine*, writes as follows about the cuckoos there:

"The cuckoo (*canorus*) returns to Palestine at the end of March or beginning of April, when it is particularly obnoxious to the bush babbler (*Crateropus chalybeus*), which clamorously pursues it in the Jordan Valley. It is spread generally over the whole country. In Algeria the cuckoos (*Coccystes glandarius*) deposit their eggs in the nest of the Mauritanian magpie, the eggs of which they very closely resemble. In the Holy Land I have found them only in the nest of the hooded crow (*Corvus cornix*), and that very frequently. No doubt they will also be found in the nest of the Syrian jay, which is common in districts like Carmel, where there are no crows, and where the spotted cuckoo abounds."

In a letter with which Canon Tristram has kindly favoured me, in reply to my queries about the date of cuckoos' leaving the Holy Land, he writes:

"I cannot state the exact date of departure of the cuckoo from the Holy Land, because September is the only month which I have not spent in natural history work in the country. I have noticed the

cuckoo in the beginning of August, but have never seen it in October.

"I have taken many eggs of *Coccystes glandarius* in Algeria, and a few in Palestine, but I have always found the eggs of the foster-parent sound and good. I have found four cuckoo's eggs, and only two of the African magpie in the nest, and all fresh. In Palestine there are no magpies, and we only found the cuckoo's eggs in carrion crows' or jackdaws' nests—not in jays', though these are very common. (This does not prove that they do not use the jay's.) I have myself taken a blue cuckoo's egg from a nightingale's nest, at home.

"On referring to an old note, I see I had a cuckoo *of the year* brought me in October. This was in Galilee."

If, therefore, we say that in Palestine the common cuckoo is found there from the 1st of April to, say, the end of August, this gives five clear months—abundant time to rear a brood.

As a proof of how well certain of the *Glandarius* species can match their eggs with those of the birds in whose nests they lay them, the following may be cited from Professor Alfred Newton:

"In the autumn of 1857, I had received from Mr. Tristram all the eggs collected by him in Algeria during the preceding season. When they were unpacked, it appeared that there were two more specimens of the egg of a large North-African cuckoo *(Oxylophus glandarius)* than I had been led by him to expect. On examination I found that the first two eggs of this species which had been obtained by him so much resembled eggs of the magpie of the country

(Pica mauritanica), in the nests of which they had been found, that, skilful oologist as he was, they had passed, even to his practised, unsuspecting eye, as those of the latter bird." *

XXXII.

THE AFRICAN EVIDENCE.

SOUTH Africa certainly boasts its full compliment of cuckoos; but it is to be regretted that in Layard's *Birds of South Africa*, though edited by Dr. Bowdler Sharpe, information is not *systematically* given as to habits of parasitism, etc. — points which it would have been so important for comparative ornithologists to be advised about. Only about two, indeed, out of more than a dozen have we distinct and clear information on these heads.

The black-crested cuckoo is stated to deposit eggs in nests of the geelgat *(Pycnonotus capensis)* and *Sigelus silens*.

Mr. H. Bowker observes about the black-and-white cuckoo *(Coccystes jacobinus)*:

"This cuckoo lays in the nest of the black-forked spreo *(Dicrurus musicus)* and also in that of the woodpecker. It looks after its young to see that the foster-parents are attentive to them. I once watched a woodpecker's nest, and when the nurses brought food to the nest, they were always followed by one of these birds, who, after the woodpeckers left, invariably looked into the nest to see if all was right, and

* *Zoologist*, 1873, p. 3508.

then sat near until the return of the woodpeckers, when the same thing was repeated. On examining the nest I found four fine young cuckoos in it." *

Mr. Layard quotes Le Vaillant about the golden cuckoo that it lays a white egg, and states that he gives an account of the manner in which it is carried in the mouth, to be placed in the nests of these birds which are selected as foster-parents for its neglected offspring.†

The black-and-white cuckoo of South Africa, parasitic mainly on the woodpeckers, thus, like the great spotted cuckoo, does not limit the number of its eggs intruded into one nest even to two, but puts the lot into one nest, where clearly the young do not contest with each other the right to it, making thus the watching for the parents easy.

XXXIII.

THE INDIAN EVIDENCE.

THE Indian evidence for one thing proves, that in the case of certain parasitic cuckoos there, the eggs are so like to those of the birds in whose nests they are dropped, that they are very apt to be overlooked: and, secondly, that eggs of cuckoos, deposited at such times as the eggs of victimised birds are not ready, are not uncommon either; which just shows that if the cuckoos, there as well as here, cannot find the exact nest ready, they are compelled to take just what they can get.

* *Layard*, p. 159.
† *Layard*, p. 154.

And, thirdly, that in India—as there are, indeed, some grounds for believing was once the case with our common cuckoos—certain of the cuckoos there pierce the eggs in nests which do not suit them, and suck out their contents; all which has an illustrative bearing, more or less direct, on our own cuckoos and their habits in certain ways. Fourthly, that in India, *Cuculus canorus*—which remains there for full six months—affords yet further proof that pressure of time, due to migration, cannot be, as Mr. Darwin and Mr. Romanes have said, the one sufficing motive to the parasitism it practises; and, fifthly, that some parasitic Indian cuckoos do not throw out the young of foster-parents, and others have at least two broods a year—the second eggs being laid before all the first brood are flown.

Here are some cases under the first head:

I. Miss Cockburn, for long, finding no eggs that she could identify as those of the Indian plain cuckoo (*Cacomantis passerinus*), thought that it did not breed in the Nilghri Hills. But, at last, she had the fullest and most satisfactory evidence that it did,—its egg, however, being such an exact imitation of the common wren warbler, that it was not at all recognised. Miss Cockburn's statement causes Mr. Adams to say:

"Miss Cockburn's interesting note on the breeding of this species fully explains what I thought at the time to be a case of fraud on the part of some of our native fellow-subjects. Towards the end of September, 1866, when in Lucknow, I had small boys collecting nests for me, and on two occasions nests of *Prinia inornata* were brought to me, containing an egg like that of *Prinia inornata*, but slightly larger;

in fact, exactly like that described and sent by Miss Cockburn. I accused the boys of having taken the eggs from some other nest, but they maintained they had not done so. I did not believe them then, but I do now." *

So like are the eggs of the crested pied cuckoo of India to those of the babblers (*Argya* and *Crateropus*), usually chosen, that they are hardly distinguishable. In colour they are a spotless blue, darker or lighter in different specimens, but all are highly glossy, and closely resemble the eggs of *Argya caudata*, in whose nest the cuckoos' eggs are laid. Col. W. Vincent Legge says:

"Even from the eggs of *Crateropus malcolmi*, in whose nests they are, in Upper India, most commonly found, it is only by their somewhat diminutive size and very round oval shape that they can be distinguished. This babbler itself, however, sometimes, I believe, lays abnormally small eggs of this shape, so that the only specimens I fully rely on are those that have been taken out of the oviduct of the female. These are very round ovals, recalling in shape the eggs of the bee-eaters." †

II and III. Colonel Butler, who paid particular attention to the crested pied cuckoo of India (*Coccystes jacobinus*), says:

"They seem to deposit their eggs in the babblers' nests at any time, quite regardless of the condition of the eggs of the nest in which they are laid. I have often noticed, also, that when they discover a nest which does not suit them to lay in, they almost

* *Hume*, ii, p. 387.
† *Hume*, ii, p. 391.

invariably destroy the eggs of the babbler by driving a hole into them with their beaks, and sucking a portion or the whole of their contents."*

The female koel (from *ku-il*, its cry), as has long been known in India, deposits her eggs almost exclusively in the nest of the common crow (*Corvus splendens*); more rarely in that of the carrion crow (*Corvus culminatus*). "She only, in general, lays one egg in each crow's nest, and mostly, but not always, destroys the egg or eggs of the crow at the time of depositing her own. It is a popular belief that the crow discovers the imposture when the young koel is nearly full-grown, and ejects it from the nest; but this I do not think is usually the case, for I have frequently seen the crow feeding the young koel after it had left the nest. Some observers declare that the old female koel often watches the nest in which she has deposited her eggs, and when the birds are full-grown, entices them away, or, if expelled, looks after them and feeds them for a few days; but I doubt if this be the general practice. . . The crows seem to know full well that they are cuckolded by the koel, for at times you see them pursuing these cuckoos with the utmost energy, and Mr. Frith, as quoted by Blyth, states that one dashed itself against a window and was killed, when pursued by a crow."†

The koel *(Eudynamys honorata)* is common in the Andamans and Nicobars, having been observed by Colonel Tytler, besides being frequently heard by

* *Hume*, ii, p. 389.

† *Jerdon*, i, p. 344.

him calling in the woods, and its behaviour is exactly like that of those of the mainland. *

Mr. Blyth himself may be quoted here—the more that he can support his statement by the very weighty opinion of Mr. Frith:

"The koel's egg bears a very remarkable resemblance to that of the crow—only smaller. The specimen measures an inch-and-a-half in length, and its colour is slightly bluish olive green, rather pale than otherwise, with numerous reddish brown spots (much as in some blackbirds' eggs), and an indistinct zone of these near the large end." Mr. Frith has never found more than one koel's egg in a nest, and has only met with it in those of the two Indian crows." †

Mr. R. Thompson says of the Indian *canorus:*

"Lays in May and June. I found one or two birds in the nests of pipits at Almorah some years ago. . . In July the birds are well on the wing and betake themselves to lofty trees." ‡

And let it be noticed that the old cuckoos are still there, and for weeks afterwards are there.

IV. Nor can we disguise the fact that India presents evidence confirmatory on this head relating to the *Cuculus canorus* in India. We are told that in certain parts of India it breeds and remains there six months. Dr. Scully says:

"The common cuckoo is found in great numbers in the Valley of Nepaul during six months of the year—from April to October. It frequents the central wooded forests on the hillsides up to 6,000 feet,

* Hume's *Stray Feathers*, i, p. 63.

† *Asiatic Soc. Journal.*, vol., 1843, p. 295.

‡ Hume's *Nests and Eggs*, ii, p, 380.

rarely ascending to 7,000 feet. It lays in May and June, generally selecting the nests of *Pratincola maura* and occasionally that of *Pomatorhinus erythrogenys*." *

Jerdon, indeed, does not think that any of the Indian cuckoos really migrate from India.

"I believe that none of the Indian species migrate entirely from India; but they wander about a good deal at different times, all the true cuckoos breeding in the hills, some of them perhaps also in the plains. After the breeding is over, they appear to scatter themselves about a good deal over the whole country, one or two only restricting their range to the limits of the Himalayan forest."†

Clearly, therefore, these common cuckoos in India, staying there till October, and laying in May and June, have abundant leisure, even on the extended time-table of Jenner, to do their own brooding, tendence, and feeding of the young. And when we put this alongside the fact that, at least one of the Indian cuckoos is actually resident, and yet that these resident cuckoos are as persistently parasitic as the migrants, it does seem as though Mr. Darwin had absolutely failed to do the needful investigation and reading here; and in not doing so, he is all the more blameworthy, and his conduct the more to be reprobated, that one of the finest observers and scientific ornithologists had provided him with full warning not implicitly to follow Jenner, as he so foolishly did. This was Mr. Jerdon, who, in *Birds of India*, publisded in 1862, wrote as follows:

* Hume's *Birds of India*, ii, p. 380.

† i, p. 321.

"That their migratory habits, as suggested by Jenner, have anything whatever to do with it, is contradicted by the fact of the instance of many non-migratory cuckoos (the common Indian koel, for example), being equally parasitic.*

The Origin of Species, it is true, was first published in 1859; but in any of the editions after the third, Mr. Jerdon's words might have been noticed, and they certainly are not in the sixth edition, published in 1872.

But Mr. Darwin cannot be let off so easily for failing to read, or with purposes ignoring if he had read, the remarkable reports of Mr. Blyth, in the *Asiatic Soc. Journal*, for the years from 1842 –1848 more especially. Some most exceptional cases are there set down, and facts, which go directly in the teeth of what Jenner had said—in fact, a body of observation and experiment which, of itself, amply suffices to prove that migration has and can have nothing really to do with the parasitism of the cuckoo, whilst Mr. Darwin, with his perverse ingenuity, would fain have made it have *everything* to do with it. And the facts—plain facts—are all dead against him.

V. Some other points find confirmation and illustration. Captain Hutton makes the following note about *Cuculus intermedius* (the Asiatic cuckoo), writing from Mussoorie:

"The natives have an idea that this bird builds its own nest and rears its young itself. This is erroneous; but it evidently arises from the curious fact that when the young bird is old enough to leave the nest, the foster-birds feed it no longer, and it is then

* *Birds of India*, i, p. 321.

supplied by the old cuckoo, or, at all events, by one of the same species. This I have myself repeatedly witnessed, and I think it not improbable that others of the cuckoo tribe may do the same thing; for it seems almost incredible that *Trochalopterum lineatum*, in whose nest the egg of *C. intermedius* is often dropped could supply so voracious a bird after it had left the nest, neither could the little hedge-sparrows of England do so for young *Cuculus canorus*. At Jeripanee, below Mussoorie, I have seen the young cuckoo sitting for hours together on a branch, waiting for the return of the adult bird, which continued every now and then to bring supplies of caterpillars wherewith to satisfy the apparently insatiable appetite of the nestling, until at last both would fly off to another spot. To satisfy myself that it was really this cuckoo that fed the young, I shot one in the very act, and found it to be no other than our summer visitant, *Cuculus intermedius*." *

The large hawk-cuckoo of India *(Hierococcyx sparveroides)*, from Miss Cockburn's evidence, broods its own eggs, taking for that purpose disused nests of the common crow.

Jerdon tells us that, in the case of the common hawk-cuckoo of India *(Hierococcyx varius)*, he has on several occasions seen the old birds of *Malacocerus malabaricus* and *M. griseus* feeding a young cuckoo, which was following them about screaming. On one occasion, at least, there were two or three young *Malacocerei* in company, so that the young of this species of cuckoo does not always eject the eggs or young of its foster-parents from the nest.

* Hume's *Birds of India*, ii, p. 383.

Some of the Indian cuckoos that are not parasitic, on the other hand, rear successive broods, a fresh egg and full-grown young one being found in the same nest.*

Ceylon has almost the whole complement of Indian cuckoos—the common cuckoo being there either resident or migrating to India.

XXXIV.

HIMALAYAN, AMERICAN, AND OTHER EVIDENCE.

THE remarkable resemblance of our common cuckoo to certain hawks is proved to be in no way accidental since resemblances even more close and striking to hawks are found among foreign species. For example, take *Cuculus sparverioides* of the Himalayas, which in appearance, says Gould, much resembles our *canorus*, though slightly larger, only that the tail and wings are varied with several broad bars of brown, and the breast blotched with patches of the same tint, which gives it a great resemblance to some of the *Falconidæ*, particularly to the *Falco sparverius*, whence it derives its specific name: whether it is parasitic or not, Gould did not know at the date of publication of *Birds of the Himalayas*.

The naming of various owls and hawks bears testimony to the resemblance. Thus the little owl of the Himalayas, named *Noctua cuculoides*, exhibits exactly the style of colouring of the immature cuckoo. The cuckoo-falcon of West Africa, named *Aviceda cucu-*

* *Jerdon*, i, p. 318.

loides, is marked exactly after the cuckoo; hence its name.

This is, no doubt, connected with the mobbing by little birds, which has been observed in nearly all countries. In this resemblance to the owls and hawks, it finds not only escape from some enemies, but also what, as Dr. Bowdler Sharpe says, must materially aid it in some of its processes connected with deposition of eggs—only that, in our opinion, the purpose of such mimicry must be at once more direct and of wider scope for use than he quite sets forth.

Gould, in his *Birds of Britain*, says "the Spanish sparrows pursued the great spotted cuckoo in flocks till even a cuckoo's life ought to have been a burden to him."

Audubon says of the American cuckoo that "its nest is simple, flat, composed of a few dry sticks and grass, formed much like that of the common dove, and the eggs are four or five in number, of rather an elongated, oval form and bright green colour. *It sometimes robs smaller birds of their eggs, and its own egg, which cannot be mistaken from its singular colour, is occasionally found in another bird's nest.*"

Now, we want much more careful and exhaustive observation of American cuckoos even now—observation by different competent persons at different points constant and thorough, and then checked and compared, before we set down that these cuckoos are practically innocent of parasitism or fall into it only occasionally. They build a rough nest and lay four or five eggs; but these eggs are found in other birds' nests, in some places frequently.

Now, my belief is that beyond a certain number of eggs the American bird, too, is parasitic, recognising the fact that it would be too much for it to have more than four or five young ones to feed — and, query, does it, like certain of its relatives, turn some of these, on being fledged, over to the care of other birds?

The words I have put in italics above are very significant—the robbing of other birds' nests being probably in some way connected with the mobbing, and the egg of the American cuckoo, which is sometimes set before us as non-parasitic absolutely, in other birds' nests is richly suggestive in several ways —which Mr. Darwin did not note.

Jerdon emphasises the same fact about the American cuckoo. He says:

"The American cuckoo, though it ordinarily incubates its own eggs and feeds its progeny, does sometimes adopt the procedure of the *Old World Cuculinæ*." *

Evidence accumulates year by year to prove that the character of the American cuckoo, if once as good as painted, is deteriorating from the high standard ornithologists of old were fond to give it; and this testimony is from all parts—north and south, east and west. They are no longer the "unqualifiedly well-behaved parents" of Dr. Bowdler Sharpe, nor do they "faithfully incubate" all "their delicate sea-green eggs," as Professor A. Newton has it.

Mr. MacIlwraith, in his *Birds of Ontario*, writes:

"The two kinds of cuckoo we have in Canada are not so totally depraved as the British cuckoo. They

* *Birds of India*, i, p. 321.

usually build a nest and bring up a family, but even to them the duty does not seem to be a congenial one, and they are sometimes known to slip an egg into each other's nests, or into that of a different species. The nest they build is of the most temporary character, and the eggs are deposited in such a desultory manner that it is no uncommon thing to find fresh eggs and young birds in it at the same time.* . . . Last summer a pair had their nest and reared their young within fifty feet of my residence. They were very seldom seen near the nest except when sitting on it. The nest was very flimsy, placed near the end of a horizontal branch of a maple about eight feet from the ground."

Mr. MacIlwraith notes that the eggs vary from four to eight or nine. †

This is a very large margin in the laying. My theory of it is that the bird usually produces as many eggs, but, beyond four, places them always, *when it can*, in the nests of other birds. Sometimes, however, it will happen that it cannot find such nests ready for it, then it puts them into its own nest, but only then, thus laying on themselves the burden of having young throughout a very long season—young ones and fresh-laid eggs being in the nest together.

Mr. MacIlwraith has also this significant passage: "In the report of the Ornithological subsection of

* "The nest of the yellow-billed cuckoo is a very flimsy structure of about twenty straws crossed, and so poorly put together that after a high wind eggs of both this bird and the mourning dove are frequently found on the ground in pieces: that of the black-billed cuckoo is only one shade better."—William Lloyd on "Birds of Texas" in the *Auk*, 1887, p. 190.

† p. 240 (edition, 1894).

the Canadian Institute for 1890, Dr. C. K. Clarke, of Kingston, Ontario, brings forward three cases of parasitism in the black-billed cuckoo, observed by himself, of the correctness of which there can be no doubt. The first birds Dr. Clarke observed being imposed upon were a pair of chipping sparrows, who raised the young cuckoo at the expense of the family.

"Next came a pair of yellow warblers, whose *protégé* soon crowded out the legitimate occupants of the nest. They were raised from the ground and placed within reach, but the big boy required all the attention of the foster-parents and the others died. During the whole period the old cuckoo was always to be found flitting about in a restless manner, as if she had some doubt in regard to the ability of the warblers to take care of her child.

"The third case was another pair of chipping sparrows, in whose nest the cuckoo was observed sitting, and from which she did not move till the observers almost touched her. The result was the same as in the other cases. The young cuckoo threw the sparrows out as soon as he had the strength to do so."*

* Page 241. *Birds of Ontario.* 1894. This took place in 1890, Dr. Bowdler Sharpe's handbook was not issued till 1896. There he speaks of the black-billed cuckoo and yellow-billed cuckoos rearing their own young, and as being both "*most affectionate parents*" (!) How close the analogies between men and animals—even birds! In opposition to the views of earlier anthropologists, it is now found—inevitably found—that, with savage races, the practices of infanticide and exposure, only intensify the affection of the parents for those that are kept alive, so *it may be*, that the American cuckoos are the more "affectionate parents" to those they rear in the ratio of the numbers they have exposed—in other birds' nests.

Now, if three cases like these have been observed by one man, is it not possible that many might be observed if people generally were as observant. The more recent the books, or magazines, or journals we have consulted, the more definite are they on this head, with new instances many.

Mr. J. L. Davidson, of Lockport, N.G., writes this to the *Auk*, 1887, pp. 263-4 :

"I have the eggs of *Coccyzus Americanus* and *C. erythrophthalmus*, taken from nests of the wood thrush—two of the former and one of the latter. I also found a nest of *Merula migratoria* (American robin) taken possession of by *Coccyzus Americanus* before it was finished, which was filled nearly full of rootlets ; and in this condition the robin laid one egg and the cuckoo laid two, and commenced incubation, when a mourning dove (*Zenaidura macroura*) also occupied it, and laid two eggs, and commenced incubation with the cuckoo. I found both birds on the nest at the same time, when I secured nest and eggs. The eggs of the robin and cuckoo were slightly incubated; those of the mourning dove were fresh." The above was published in *The Forest and Stream*, August 24th, 1882, p. 65.

"I have also a nest of *Sayornis phœbe*, in which a robin's egg is nearly embedded, and another of this same species with a cowbird's egg quite covered over. The latter is found in the nests of small birds, but I have found them covered up, except in this instance, only by the goldfinch and summer warbler."

We have an instance or two of black-billed cuckoos laying in disused crows' nests, which shows the dislike to nest building, and this dislike itself might

well be viewed as a stepping stone on the way to parasitism.

Mr. C. J. Maynard, in a book issued as late as 1882, has the following :

"Two or three instances have come under my notice, where either the black-billed cuckoo has deposted its eggs in the nest of the yellow-billed cuckoo, or *vice versâ*, and, furthermore, I have been informed by such good authority that I see no reason for doubting it, that sometimes the eggs of the black-billed cuckoo are to be found in the nests of other birds, and have been taken from the nests of chipping sparrows. It is, of course, possible that this habit, instead of being only an occasional outbreaking of one that is nearly always latent, is progressive; or, again, under favourable circumstances, it may become more general; in fact, as fully established as that of the cow-bunting, but this is a matter for ornithologists of future generations to prove." *

We may say, however, that the yellow-billed cuckoo is the great offender in destroying eggs of other birds.

Here then we have an area of fresh facts in our favour, and also an able American ornithologist, who directly suggests the position we are fain to take—to establish, that is, a marked and increasing tendency to parasitism among the American cuckoos—all going to support the plea of a much closer relation between them and our *canorus* than has been yet at all realised, and certainly in no way going to support Professor Alfred Newton's *Encyclopædia Britannica* deliverance

**Birds of Eastern North America*, p. 217, ed. 1882. The chipping sparrow, as Mr. Nehrling tells us, is everywhere a bird of the orchard and garden.

with regard to these two American cuckoos as follows:

"There are two species very well known in parts of the United States and some of the West India islands (*Coccyzus Americanus* and *C. erythrophthalmus*), and each of them has occasionally visited Europe. They both build nests—remarkably small structures when compared with those of other birds of the same size" (he should have added that they were most flimsy as well as small)—"*and faithfully incubate their delicate sea-green eggs.*" . . . . Respecting these cuckoos of America, the evidence is *certainly enough* (italics here and just above are mine) "to clear them from the calumny which attaches to so many of their brethren of the Old World."

The evidence is *certainly* nothing of the sort; and it was in existence partly (see Mr. Nuttall's recorded observations) before Professor Newton ventured on this very bold and unqualified statement in the *Encyclopædia Britannica*. But this might have been passed over had Professor Newton not been of a mind to persist too far in his old opinion at quite a late date, after the evidence had become too strong not to be recognised as evidence even by him. His article in *Dictionary of Birds*, in 1893, tells that he had heard of it; but all he can afford to do there is to re-write and very slightly alter the *Encyclopædia Britannica* article, *ad loc.* to the following effect:

"Respecting the cuckoos of America, the evidence, though it has been impugned, is *nearly enough*" (nearly enough now, mark) "to clear them from the calumny which attaches to so many of their brethren of the Old World—they faithfully incubate their deli-

cate sea-green eggs"—which, mark you, the "nearly enough" above by implication told that they did not —not quite all like the auctioneer's going–going—gone—not quite *all !*

The good character of these species is undoubtedly going year by year, and various instances, most distinctly indicating this, were published prior even to the date of Professor Newton's *Encyclopædia Britannica* article; and they had increased to a large volume before he issued his *Dictionary of Birds* in 1893. So notorious is this now that, under the heading "Canada"—Canada very significantly not being mentioned in the above passage, though it is like to become more and more important in this respect—in section, *Distribution of Birds* in *Encyclopædia Britannica*, Professor Newton, in next edition, will need to add that these two species of American cuckoos, to which he has referred, have there, as in a middle connecting land between this country and the United States, shown most markedly the process of passage of cuckoos in America towards affinity with our own common cuckoos in their parasitic habits, and not "faithfully incubating *(all)* their delicate sea-green eggs." Since 1882, as the evidence of Mr. MacIlwraith and others efficiently shows, instances have increased in a remarkable ratio—all to the same effect.

Mr. Darwin's own statement about the "occasional habit" of depositing eggs in other birds' nests as suggesting but a step in the progress towards *canorus's* "wicked waze," might have given pause to Professor Newton's pen on this point, or given impetus to it; and ought even now to make him pull up (his attention having thus been emphatically directed

to it) and to recognise and acknowledge that he had for once been too slow, and moved all too like that wonderful young *podicipes fluviatilis*, which he so aptly celebrated in *Zoologist*, 1889, p. 577. Mr. Darwin and Professor Newton are here, at all events, at loggerheads; they diametrically oppose each other, and, once again, to quote Artemus, "you pays your money and you takes your choice." The Professor's difference is not with me, but with Darwin: let the two sides fight it out.

Had Professor Newton, when he revised the article, cuckoo, for the *Dictionary of Birds*, come across none of the late facts on which Mr. G. T. Gentry — one of the latest and most reliable writers on American ornithology—based, when he made this record:

"Mr. Nuttall," he writes, "has recorded the finding of the cuckoo's egg in the nest of a cat-bird, and another as late as the 13th of July in a robin's nest. These were considered at first as rare, if not incredible, instances; but, latterly, we have had several well-authenticated cases of such parasitism. These observations, coupled with others equally important, which have been recorded, *tend to show a close relationship between our American cuckoos and their not very distant European brother.*" *

Professor Alfred Newton well observes the motto: *Festina lente.* In 1877 the utterance was pardonable; but here we have, in 1893, close alongside each other, the two statements that the evidence is only *nearly enough* to clear the two American cuckoos, and that

* Italics are mine. *Nests and Eggs of American Birds*, p. 270, ed. 1882.

they still "faithfully incubate their delicate sea-green eggs." That is scientific exactitude with a vengeance. Caution run mad *nearly enough*, and leading *nearly enough* to logical contradiction. The evidence of Mr. MacIlwraith, or Mr. Nuttall, of Mr. G. T. Gentry, of Mr. J. L. Davidson, and not a few others, was before Professor Newton in 1893, and that is all the modification he will make. Surely it is not too much to say that Professor Alfred Newton is more concerned for his *amour propre* than for evidence; and we are to bow down grovelling before his "authority" in a case where facts—observed facts—must alone decide it.

Mr. Gentry, in his *Birds of Pennsylvania*, ii, p. 115, remarks concerning the American cuckoo:

"As the eggs are deposited at irregular intervals, it happens that the same nest contains both eggs and young birds, which seems to be a wise provision of nature in strengthening that degree of warmth which is denied by the shallowness and looseness of the nest."

Mr. Gentry has never known more than a single brood in one season—a most important point in view of the disposal by the majority of these cuckoos of one half of their eggs.

These facts are certainly not without their own significance in view of our proposition. These birds, in the words of Mr. MacIlwraith, exhibit no love for the brooding and rearing process as do most other birds; they are fain to limit the period of it—also the number of young raised by themselves. They build but a sorry make-shift of a nest, without sufficiency of warmth. They, at least, have a strong *tendency*

THE AMERICAN YELLOW-BILLED CUCKOO.

to parasitism; and, what is more natural in such circumstances and with such a predisposition, that amid favourable surroundings they should become more and more parasitic. We should regard that as a most natural and logical inference from the facts we have before us; and if Professor Alfred Newton maintains the opposite, we have simply to say that we out and out disagree with him, and that his bold ignoring of the facts will in the end not benefit him any more than it would anyone else.

And it is unquestionable that, under civilization and man's improvements, the numbers of cuckoos in America are extending as their range is increasing.

The yellow-billed cuckoo has a very extensive range in summer; breeding from the Gulf coast north to the Dominion of Canada, New Brunswick, and Minnesota, and from the West Indies, where it is known as the "Maybird," and through Eastern Mexico to Costa Rica. Some even winter in Southern Florida. . . . Of late years it has made its appearance even in the City of Milwaukee, where apple orchards occur. Though timid and shy, it becomes very confident and conspicuous in gardens and in hedgerows, where it feels safe and is convinced that man is its friend and not its enemy. The number of the eggs vary from three to six, but sets of three are most common. It now and then at least practises the vice which disgraces so many of its relatives, and lays its eggs in the nests of other birds. The egg has been found in the nests of the wood-thrush, robin, catbird, cedarbird, cardinal, mourning dove, etc., etc. *

* Henry Nehrling's *Our Native Birds* (Milwaukee). 1896.

There are no doubt some good points about the American cuckoos, though most assuredly they do not lie in the direction Professor Alfred Newton and Dr. Bowdler Sharpe would point us, especially after what Darwin himself had said in the eighth chapter of his *Origin of Species!*

Let us do them all the justice that we can. They are first of all very devoted to each other in the period of brooding.

Mr. O. Widmann thus makes record of an observation on 12th May, 1894, to this effect regarding the yellow-billed cuckoo whilst brooding:

"The female, at this particular period of her life and love, seems to care little for other food than that which her courteous and attentive mate provides for her. She keeps quietly sitting in all her loneliness, as if lost in pleasant reverie, patiently awaiting his return. In the exuberance of his affection, instead of taking a seat at her side, as other birds would do, he gracefully alights on her shoulders, slightly spreads his wings as if in embrace, bends forward over her head and puts into her open bill the tender willow-fly, an ephemera of larger size." *

And, secondly, they seem to have more possibilities of being tamed and trained than our cuckoos, if we may judge by a record published by Mr. Koumly, of Seneca, Kansas, communicated to the *American Ornithologists' Union Journal*, 1893, p. 368, where he told of these birds frequenting houses and buildings. "A female yellow-billed cuckoo herself frequently visited the college chapel of St. Benedict's, Atcheson, Kansas. She was not flying about when I saw her,

**Auk*, 1895, p. 114.

but stood on the floor, on which she had laid an egg, and to all appearance was standing guard over it."

This, which is most evident from these facts now recited, bears vast significance in favour of evolution, in such a marked manner, indeed, that Professor Alfred Newton, determinedly closing his eyes to it, is a most peculiar spectacle in these, the closing years of the 19th century. We have certain clear results in our country—results that would seem to lie far back, due to original instinct, were it not for unchallengeable proofs of return on an earlier habit now and then. Behold, in America, certain clear steps in the process, coinciding with remarkable progress in occupation and improvement in land, and the cutting down of forest, and planting of fruit and thin-leaved trees. And yet Professor Alfred Newton will not see in these facts any significance at all. None are so blind as those who will not see!

Mr. Beddard, in his careful and almost exhaustive paper on the anatomical structure of the cuckoo (*P. Z. Soc.*, 1885, pp. 168—179), decides that no true mark of classification can be found in the gall-bladder; and he finds a broad line of separation between the genera of the old world and the new in the ventral tract—in the *Cuculus*, *Chrysococcyx*, *Cacomantis*, and *Coccystes (?)* of the old world it is a single tract at its commencement, whereas in the genera *Saurothea*, *Diplopterus (?)*, *Piaya*, and *Coccyzus* of the new world it is double; but, certainly, general tendency and habit are not much modified by that.

The two common cuckoos of the Bahamas and the West India Islands—the American cuckoo and the

mangrove cuckoo (*Coccyzus minor*)—both brood their own young;* but surely Professor Newton, in view of the clear evidence that the American cuckoos are found, under certain conditions, laying eggs in other birds' nests, goes too far in absolutely ignoring or quietly setting aside all this evidence.

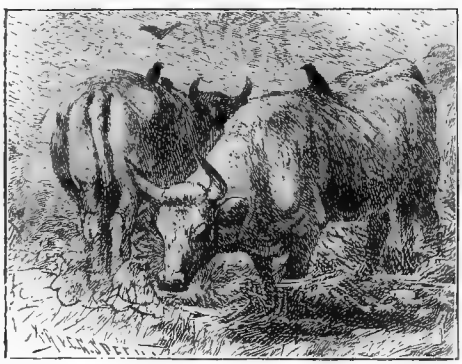
The peculiar fact, that in certain latitudes we have varieties of the cuckoo, some of which, at all events up to a certain point, brood their own young and nurse and feed some of their progeny, and yet in structure do not differ substantially from our cuckoos; and that, outside this, you have generally a full tendency to parasitism, or more or less a clear tendency to it, has not, in our idea, had the attention that it deserves. Either climate or food must have something to do with this, or else points in the structure and economy of these birds have not yet been observed, studied, and fully illustrated. Can the fact of comparatively recent settlement by white men, carrying with them the work of civilization, have anything to do with it? In latitudes throughout which the work of civilization has for ages gone on, there you will find the cuckoos, or certain of the cuckoos, pronounced parasites, whereas in latitudes more recently opened up to civilization and the introduction of the changes that inevitably come in its train, you have cuckoos that are clearly only more or less on the way to full parasitism.

* *Cory*, pp. 116—117.

XXXV.

INDIRECT EVIDENCE FROM THE AMERICAN COW-BIRDS.

We have already referred to one point in which a striking commentary on certain actions of the common cuckoo is found in the *molothrus* or cow-bird—an American species allied to the starlings. They are called cow-birds because they are often seen on the backs of these animals or among the cattle on the ground picking off insects that are



COW-BIRDS ON COWS' BACKS AFTER INSECTS.

there. . . .* We may here indicate some other points which will be suggestive and illustrative of certain traits to be found probably more or less in all parasitic birds.

I. The cow-bird's eggs not only vary greatly in

* *H. Nehrling*, ii, p, 31.

colour, but also in size. They show a pearly white, often a pure white, or greyish white, or pale bluish ground colour, and are often spotted, more or less densely, with chocolate-brown, lavender and cinnamon-brown spots.* We have as yet, though we have very diligently sought for it, met with no record as regards the weight of these eggs as compared with the eggs of other birds of the same size; but, from analogy, we should expect it to be comparatively heavy, as is the case with our cuckoo's eggs. Dr. Elliot Coues, one of the best authorities regarding this bird, writes:

"No *à priori* reason appears to me why the egg should not have been of ordinary dimensions and a different series of birds been called upon to incubate it; while, as the facts stand, it is clear that the bigness of the egg in comparison with those among which it is usually deposited, and not its smallness relative to the cow-bird's bulk is the favouring element; for the larger egg must mechanically obstruct the incubation of the smaller eggs, and so receive the greater share of warmth from the bird's body. . . It is unusually small that it may be committed to the charge of birds able to hatch it, yet too weak to eject it."†

Mr. Hudson notes the great variety of eggs, but, from observations, thinks that the eggs of the same individual show a family likeness.

The cowbird's eggs, like our cuckoo's, are thus very small compared with the size of the bird.

Major Bendire, in his most interesting monograph

* *Nehrling*, ii, p. 245.

† *Birds of the North-West*, p. 152.

on the cow-birds in *Smithsonian Report*, 1893, gives more detail than we find elsewhere on the extraordinary diversity in eggs of *Molothrus bonariensis*.

"I doubt," he says, "whether any other species exists laying eggs so varied. About half the eggs one finds, or nearly half, are pure unspotted white, like the eggs of birds that breed in dark holes. Others are sparsely sprinkled with such exceedingly small specks of pale pink or grey as to appear quite spotless until closely examined. After the pure white, the most common variety is an egg with a white ground, densely or uniformly spotted or blotched with red. Another not uncommon has a very pale, flesh-coloured ground, uniformly marked with fine characters, that look as though inscribed on the shell with a pen. Rarer is a variety pure white with variously sized chocolate spots: rarest of all is one entirely of fine deep red, and between this and the white one with almost imperceptible specks are varieties without number, for there is no such thing as fixed characteristic markings."

And the cowbirds' eggs vary as much in size and shape as in colour, markings, etc., they range from ovate to short, rounded and elongate-ovate, the first predominating. The shell is strong, and no doubt, as with the egg of the cuckoo, comparatively heavy.

This leads to no end of points of comparison with the eggs of our common cuckoo. Are they thus variegated for the same reason as is generally assumed in regard to variety of colour and markings in eggs of our cuckoo, or what? Does each slightly different variety belong to one bird, which does not vary from type or tint, or mark in any respect, or by one iota,

or is there a range of difference, slight yet perceptible, even in the eggs laid by one bird? Fain would we learn something of these things, as well as satisfaction on the question of weight, and whether in weight the eggs of different tint or colour vary from each other, and within what range, if any, among themselves. For that we must wait yet, we fear, a long while: and mention the point merely in the hope of bringing these elements for comparative purposes a little time sooner.

II. We have found record so frequently that the eggs of our common cuckoo found in nests are more advanced towards hatching than those amongst which they are placed, as to be almost forced to the conclusion that they hatch in a shorter space of time than do the eggs of the victimised birds. The eggs of the cow-bird hatch in eleven days, as against fourteen to sixteen days in the case of the birds into whose nests they are intruded. Nehrling tells us that when the cow-bird drops an egg into the nest of a smaller bird it is first hatched; getting all, or nearly all, the heat of the sitting bird's body.

III. The molothrus manages, somehow, to dispose of the other young birds in the nest; for soon after exclusion from the shell they disappear.

Mr. Nehrling writes:

"In Texas I found two parasitic eggs in the nest of the painted bunting, and of three in the nest of the orchard oriol, only one was hatched, while the other disappeared in a mysterious way with the foster-parent's own eggs. In the nest of a yellow-breasted chat, in South-Western Missouri, three cow-bird's eggs were found, together with one of the rightful

owner. One disappeared before hatching, and so did the owner's eggs, while two cow-bird's eggs were hatched. At the age of three days one of the young parasites disappeared, and only one left the nest of its foster-parents. . . It is not unusual to find one or more eggs of the rightful owner thrown out of the nest, and it is supposed that the female cow-bird is responsible for it. This is doubtless done to enhance the chances of her own offspring. In other cases there are minute punctures in the shells of the remaining eggs, and this is probably done on purpose by the cow-bird, to keep them from hatching.*

Major Bendire thus supplements Nehrling:

"There is no doubt that the cow-bird sometimes throws the rightful owner's eggs out of the nest purposely to enhance the chances of its offspring coming to maturity. I have yet to see a punctured cow-bird's egg. . . . One would naturally suppose that birds breeding in holes in trees or under rocks would be exempt from this infliction, but this it not the case. Mr. G. W. Smith, formerly of Loveland, Colo., writes me that he found a cow-bird's egg in a rock-wren's nest which was placed under a ledge of rock fully two feet from the entrance, and which was barely large enough for the wren to squeeze through. The dwarf cow-bird," adds Major Bendire, "which usually selects nests of small birds for its eggs, is a more persistent puncturer of foster-birds' eggs than even the others."

Mr. W. A. White, of Mathews, Va., especially watched a nest in which he had dropped a cow-bird's egg.

* *Nehrling*, ii, pp. 244-5.

"The daily increase in the dimensions of the young cow-bird was something immense, while his younger companion seemed rather to diminish than enlarge, and at the end of three days he died evidently from want of food.

Mr. Nuttall has seen the parent birds removing the dead young to a distance from the nest and there dropping them.* The inference is, of course, that the intruders of their own eggs have killed the true young of the nest, and left them for the parents to remove from the nest.

IV. In the case of *Molothrus bonariensis* the males are much more numerous than the females. "Azara says that nine birds out of ten are males. The reason, perhaps, is that the *male eggs* of the cow-bird are harder-shelled than the *female eggs* and escape destruction oftener when the parent bird exercises its disorderly and destructive habit of pecking holes in all the eggs it finds in the nests to which it intrudes. . . . In Buenos Ayres, where they are most numerous, they have a migration, which is only partial, however. It is noticeable chiefly in the autumn, and varies greatly in different years. In some seasons it is very marked, when for many days in February and March the birds are seen travelling northwards, flock succeeding flock all day long, passing on with a swift, low and undulating flight, their wings producing a sort of low, musical sound." †

Major Bendire tells us in his excellent treatise on the cow-birds in *Smithsonian Report* for 1893, that of the twelve species, three are found in the United

* Baird's *N. American Birds*, ii, p. 155.

† *Birds of the Argentine*, p. 73.

States; *Molothrus ater*, *molothrus ater obscurus*, and *Callothrus robustus*, and a fourth, *Callothrus æneus*, is a resident of Western Mexico and portions of Central America. The remaining species are confined to Central America. "It is probable," he writes, "that nearly all these species are parasitic to a greater or less degree, laying their eggs in the nests of other birds, and letting them perform the duties of incubation and rearing the young, with the exception of *Molothrus badius*, the bay-winged cow-bird (of the Argentine, Paraguay and Bolivia), which occasionally builds a nest of its own or appropriates nests of other species, but incubates its own eggs or cares for its young like other respectable members of the Avian family." Our cow-birds are among the few, if they are not the only, birds which practise polyandry, which is probably caused for the reason that the males generally outnumber the females by about 3 to 1. (Major Bendire in view of our *Canorus*, etc., should have deleted the clause, "if they are not the only birds.")*

Dr. Elliott Coues tells us "The cow-birds never mate; their most intimate relations are no sooner effected than forgotten; not even the decent restrictions of a seraglio are observed: it is a perfect community of free-lovers, who do as the original cynics did. The necessary courtship becomes in consequence a curiously mixed affair. During the period corresponding to the mating season of orderly birds, the patriarchs of the sorry crew mount the trees and fences, and posture and turn about and ruffle their feathers to look bigger than nature made them . . . .

* Pp. 589-590.

while the females perched near by, without seeming enthusiastic, take it much as a matter of course, listening at times it may be, but as likely preening their plumage with other thoughts and an ulterior purpose. The performance over, a very little while afterward the whole band goes trooping after food to the nearest cattle-yard or pasture."

In how far, as suggested already, may the same causes account for the great disproportion in numbers of the sexes of our common cuckoo? Has hardness and weight of the shell here, as there, a great deal to do with it? Were Mr. Bidwell's highest weight eggs those of males, and the lowest weight eggs those of females?

V. Mr. Hudson, speaking of the *Molothrus bonariensis*, says:

"It continues in better condition than other species, not having been engaged in the exhausting process of rearing its own young, and, moreover, being *gregarious and practising* promiscuous sexual intercourse, must lay a much greater number of eggs than other species.* *Hens that never become broody lay a great deal more than others. In wild districts, where the parasitic instinct was formed, and where birds building accessible nests are proportionately fewer, the instinct seems different from what it does in cultivated districts.* Parasitical eggs are not common in the desert, and even the most exposed nests are probably never over-burdened with them. But in cultivated places, where their food abounds, the birds congregate in the orchards and plantations in great numbers, and avail themselves of all the nests—ill-

* P. 277.

concealed as they must always be in the clear, open-foliaged trees planted by man."* A point this which certainly deserves more special and exact working out than it has yet got; leading us, as it does, to a vast problem; to the part—the unconscious part—which civilized man plays, wherever he settles or advances, in gradually modifying the life and habits of all creatures, and, so far as we know, more especially of birds. He clears forests, and plants new kinds of trees: he lays out parks, and makes ornamental what before was wild: he decreases the volume of streams and rivers, by turning them to account for irrigation or for driving machinery, or other purposes, or to supply the needs of towns, in succession to, or in supplement to previous reduction, by timber cut down over wide areas, and on slopes, on hill tops, thus limiting substantially the rain-fall. The trees he plants are less thick-leaved than those he has rooted out. And as the face of the country changes—its whole physical geography being gradually modified—so do the various species of creatures change; their habits gradually modified, in obedience to the law of self-preservation and increase of the species, if not to the law of "Natural Selection" and "Survival of the Fittest."

Mr. Bartlett, in *Wild Animals in Captivity*, remarks:

"The introduction and cultivation of a particular kind of grain or fruit into a country will tend to attract some of the wild animals from the surrounding forest to the cultivated ground, and to increase their numbers by the food so readily obtained."

* Pp. 77, 78.

And he proceeded to give an illustration in the case of the frugivorous bats *(Pteropus poliocephalus)* of Australia, which, when grape-growing had been started, came to form so keen a taste for the grapes that, for a time, wine-growing in Australia seemed impossible. But not only will wild animals be attracted to the forest by the new grain or fruit—the whole insect life of the district will be changed; and, following on that change, the bird life and the relation of whole families of birds to other families of birds be conspicuously modified.

Mr. Hudson's suggestion in that last passage we have quoted would indeed carry us very far—carry us so far that a volume might well be written on it. If other birds profit in certain ways by these vast changes, however gradually carried forward, certain it is, too, that in some ways they lose—for a large body of facts we have had before us connected with the cuckoo and other parasitical birds lead to the conviction that parasitism tends to have its fuller play under the changes introduced by man, and man's advances, in what he calls, and, from his point of view, rightly calls, "improving the country"—which means the improving off the face of the earth necessarily of whole races of innocent creatures, or of the transformation of those that remain into something wholly different from what they were—alike in habit, function, and tendency—it is by such changes and modifications indeed that they survive. Elsewhere we have entered more fully into this subject.

In how far may these same operating causes, working to the same or similar results as are suggested here, be found in our common cuckoo (1) in

respect of immense superiority of males in numbers; and (2) as regards changed conditions on the country in the way of cultivation influencing these to the formation of certain habits, etc.? And what about the reason here advanced for large numbers of eggs, and how far does it apply to our cuckoo?

VI. The fact that an egg put into a nest of any species alone before the true bird has laid any will almost infallibly cause that nest to be deserted proves that the victimised birds are then sharp enough to recognise an egg not their own, the nest being so invariably deserted. Abundant authority there is to this effect.

Mr. Nuttall states that if a cow-blackbird's egg is deposited in a nest alone, the nest is uniformly forsaken.*

This fact makes it the more likely that here, as in the case of our common cuckoos, the intruding birds try to remove the true egg or eggs, thus cunningly aiding the duping by preservation of the numbers.

We read:

"Probably three-fourths of the lost nests of the scissor-tail (*Milvulus tyrannus*), are abandoned in consequence of the confusion caused in them by the cow-birds. . . I have seen the female cow-bird strike her beak into an egg and fly away with it; and watched the male bird, when she quitted it, drop down and begin pecking holes in the eggs."

In how far are we justified in saying that *Canorus* does the same?

The cow-bird, like certain of our *Canorus*, watches

* P. 157.

the nest in which an egg has been deposited—at any rate, for some time.

"In all cases where I have found this egg, I have observed both male and female cow-bird lingering near." *

Major Bendire says positively that:

"When the young cow-bird is able to shift for himself, he leaves his foster-parents and joins his own kind."

VII. The common cat-bird, we are told, rejects and ejects the *Molothrus's* egg. † And so do several other birds; building it over in some cases, when they cannot succeed in ejecting it.

VIII. Among all the varieties of *Molothrus* there is only one which preserves any semblance of true pairing. All the rest are like our cuckoos, and, as Professor Baird decisively says:

"The screaming cow-bird (*Molothrus rufoaxillaris*), is the only parasitical species in which there is conjugal fidelity;" a point on which Major Bendire speaks to exactly the same effect. ‡

More and more, therefore, with these facts before us, we are compelled to regard Mr. Darwin's dictum, that migration is the cause of parasitism in the cuckoo as a most salient instance of the vice of generalising from too narrow a basis of particulars.

IX. Major Bendire holds that *Molothrus bonariensis* once possessed the nest-making instinct, and he tells that twice he has seen birds of this species attempting to build nests, but leaving them

* John Burroughs, *Wake Robin.*

† *Birds of N. America*, ii, p. 155.

‡ P. 88.

unfinished—a recurrence too weak to be efficient to the ancestral habit. How could such an instinct have been lost? "To say that the cow-bird occasionally dropped an egg in another bird's nest, and that the young hatched from these occasional eggs possessed some (hypothetical) advantage over those hatched in the usual way, and that the parasitic habit so became hereditary, supplanting the original one, is an assertion without anything to support it, and seems to exclude the agency of external conditions. . . Again, the want of correspondence in the habits of the young parasite and its foster-parents would, in reality, be a disadvantage to the former. The unfitness would be as great in the eggs, and other circumstances: for all the advantages the parasite actually possesses in the comparative hardness of the eggshell, rapid evolution of the young, etc., already mentioned, must have been acquired, little by little, through the slowly accumulating process of natural selection, but subsequently to the formation of the original parasitical inclination and habit."

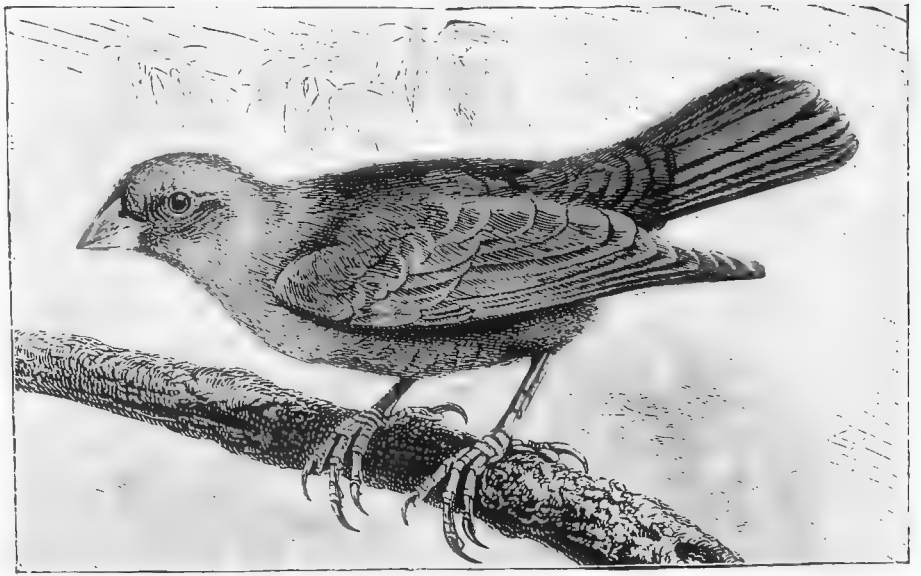
This precise argument lies, and is quite as efficient as regards our own cuckoo. The young cuckoo shows instincts wonderfully correspondent and answering to the instinct or intention or plan of its real parents, but little to that of its foster-parents: the young cuckoo will hiss and dart at anyone coming near to the nest, while the true young would have acted quite differently. This is one illustration; and, oddly enough, it would seem that the conduct of the young cuckoo is much the same whatever the nest he may be in—the true young in which nests would behave very differently. It would seem that the behaviour

of the young *Molothrus* is very different, yet quite as illustrative, from this point of definite unlikeness to the habits of the legitimate young of the nest in which it finds itself. Major Bendire has these very pregnant remarks on this subject:

"Consider the different behaviour of three species that seldom or never warn their offspring of danger: the young of *Synallaxis spixi*, though in a deep domed nest, will throw itself to the ground, attempting thus to make its escape; the young of *Mimus patagonicus* sits close and motionless, with closed eyes, mimicking death; the young of our common *Zenaida*, even before it is fledged, will swell itself up and strike angrily at the intruder with beak and wings, and, by making so brave a show of its inefficient weapons, it probably often saves itself from destruction. But anything approaching the young *Molothrus* is welcomed with fluttering wings and clamorous cries, as if all creatures were expected to minister to its necessities. . . . The young *Molothrus* never understands the language of its foster-parents as other young birds understand the language of their real parents."

Up to a certain point it is clear that the same is true of the young cuckoo in many nests in which he finds himself.

We see thus, from a comparison of the various American cow-birds, a series, so to speak, of living links in the process of development. First of all, we have in *Molothrus badius* the lower level. As Mr. Hudson says, they sometimes live promiscuously together in flocks, and sometimes pair. They either build a nest of their own or seize on one belonging



THE AMERICAN COWBIRD.

to some other bird, occasionally throwing out the nestlings of the strangers. They either lay their eggs in the nest thus appropriated, or, oddly enough, build one for themselves on the top of it. Here the nest-building habit is assertive and almost invariable. Then in *Molothrus bonariensis* we have parasitic habits much more highly developed, with a very much weakened tendency to nest-building — trials made and a beginning accomplished; but nothing further, and, finally, the indiscriminate dropping of eggs into the nests of other birds, but in such numbers that slight chance is left of many or any being hatched — since the whole habit of the victimized birds would be overturned by numbers were incubation persisted in, whereas most of the nests are deserted; while again, the *M. pecoris* of North America has acquired instincts as perfect as those of the cuckoo, for it never lays more than one egg in a foster-nest, so that the young bird is securely reared.

The vast harm caused by these cow-birds can be but guessed at. Here are the words of a close observer and good authority:

"It can readily be seen what an amount of harm the cow-bird causes in the economy of Nature, granting that only a single one of its eggs is hatched in a season. To accomplish this, a brood of insectivorous and useful birds is almost invariably sacrificed for every cow-bird; and certainly they are not diminishing in numbers." *

And Major Bendire tells that he follows practically the same good habit as Mr. John Burroughs: when

* Bendire, *Life History of Birds.*

he finds a young cow-bird in a nest, he kills or drowns it; or, when he finds an egg, he destroys it.

One point on which we would fain have more definite and reliable information about the cow-birds—results of exact observation and comparison—is, as to the disparity of the sexes in numbers. There is a great difference between three to one, and ten or nine to one. This is, to our mind, an essential element in the study of parasitic birds. We believe, as surely as we now write, that the source and origin of parasitism is to be found here in polyandrous promiscuity; and the degree to which that has advanced, owing to permanent disproportion of the sexes, is the measure in which parasitism among birds has proceeded. The two are related to each other, as cause and effect; though, indeed, conditions of culture, and changes effected by man, may be a second or collateral cause, operating to aid the other.

PART V.

STRANGE FACTS ABOUT CALLS AND YOUNG BIRDS OF *CUCULUS CANORUS.*

XXXVI.

ANOTHER point respecting Mr. Cuckoo Canorus and his family which is wrapped in doubt. Do the young birds when they are fledged learn the call-note of the foster-parents or of their real parents, deserting absolutely the former at this stage, after having got their earlier up-bringing out of them? This query is suggested by the fact that, on a certain early morning walk, I heard no fewer than four distinctly different cuckoo-calls: (1) the ordinary cuckoo-call; (2) this call in a hurried, startled, sharpened tone, as if of fear or warning; (3) a distinct and prolonged second cuck, and cuck-cuck-koo-oo; and (4) a low tentative cuck-a-cuck-koo, the *koo* being faint and indefinite, and more of the broader "a" sound. In addition to the calls being different, the notes sounded varied. I had never personally observed this before, and speaking to a yeoman friend who has spent all his life in the country, and has been out at all hours, and as a sportsman has observed a good deal, he did not receive these statements of mine with surprise or as suggesting anything novel, but gave it as his theory that the young early broods of the cuckoo in June are fledged and join older cuckoos, whether their true parents or not he could not say: that the low hesitating cuck-a-cuck-koo, with the koo very indistinct, is the note of the younger birds, and that the prolonged second *koo* is the note of the old birds, as trainers, now emphasizing that note to develop it fully in the young. This is, at all events, ingenious; it could be verified only by evidence as to whether this prolonged

second koo is definitely heard at periods so early as to make it impossible that it could be due to the circumstances to which he attributes it. He quoted the old saw, which lingers in some parts of the country and is common in our district :

> "April, cuckoo come,
> May, he sounds his drum,
> *June, he changes tune,*
> July, he may fly,
> August, he must."

This rhyme has variations in different parts of the country. Here is one :

> "In March he leaves his search,
> In April come he will,
> In May he sings all day,
> In June he changes his tune,
> In July he's ready to fly ;
> Come August, he must.
> In September you'll him remember,
> But October he'll never get over."

And surely Mr. Witchell is wrong when he says that the "cuckoo" is uttered by both sexes (p. 59, *Bird Songs and Calls*). I have always regarded this as specifically the male song or call, while "the whittling or water-burbling note," as Dr. Bowdler Sharpe well calls it, is that of the female; and this note, on being heard, draws all the males within hearing to the point from which it issued. Mr. Witchell himself, in the next paragraph, speaks of this as the female note or call.

My friend averred that, so far as his broad observa-

tion went, these old saws generally had a basis in fact.

With regard to this very important question of the note, we must make a small citation from a great authority:

Lord Lilford says of a young cuckoo taken from the nest and kept in confinement, which survived for nearly two years, that he would sit stolidly on the perch (except at migration time, when he dashed about and injured his plumage), continually chirping.

"We once only heard him attempt to say 'cuckoo,' but the attempt was a grievous failure."*

Now, Lord Lilford, we fancy, wrote the above as a record of a fact observed, without any thought of the inference—the important inference—that may be drawn from it. Is contact with the old birds essential to the development of the proper cuckoo-note? From what we have said above about what is evidently their careful efforts to induce it in the young ones, it is so. In Lord Lilford's young cuckoo, this call or note, clearly enough, was not developed; and a most interesting question, to be solved only by comparison of observations of those who may hereafter find nestlings, and, like Lord Lilford, succeed in keeping them in confinement, is, whether the chirping is like to that of any other bird; and like or not particularly to the bird out of whose nest the unfledged bird has been taken, and of this a very careful note should be made and preserved.

This little instance, at all events, seems to raise a difficulty—(presenting, so far as cautious inference may be drawn from it), in view of a somewhat over-

* *Birds of Northampton*, i, 254.

decisive statement, to the effect that "careful experiments have proved beyond a doubt that each bird's song is really inherited, and that he will sing like his parents, even though he may never have heard their song;" or, at all events, it furnishes presumably one exception of a very striking kind, that demands very close attention and special experiment.

Up to this point I was inclined to agree with the following writer in summarising the results reached by Mr. C. Dixon:

"There is no direct evidence to support the popular belief that young birds, without tuition or experience, warble off the song characteristic of their species; and every bird-fancier is aware how readily, under suitable conditions, young birds will acquire a song totally unlike what would be expected of it if the inherited ability ruled. Mr. Dixon holds that the songs of birds are acquired by imitation, and that if young birds never heard the song of their species, they would be totally unable to produce it."

But just then I was brought into correspondence with Mr. C. Campbell about the remarkable cuckoo kept by Mr. Cochrane, of Edinburgh, through reading the following paragraph in a London daily in May, 1898:

"At the last meeting of the Edinburgh Field Naturalists and Microscopical Society a live cuckoo was exhibited by Mr. Charles Campbell, who stated that it was taken from a meadow-pipit's nest in Wigtownshire in 1896, and was hand-reared. It soon became very tame, and was now a household pet. It was probably the only one of its kind that had survived two winters in this country. Although the

cuckoo had not yet arrived in the Edinburgh district, the one in question commenced its well-known call on April 9th. Mr. Campbell said he was not aware of any previous instance where the cuckoo had been known to call in captivity."

I at once wrote to Mr. Campbell and was favoured by him with the following letter and notes :

Dalmeny Park,
by Edinburgh,
23rd May, 1898.

Dear Sir,

I duly received your letter of 11th inst. regarding the cuckoo, and am sorry I have not been able to reply to you sooner. I have received quite a number of communications regarding this bird, and when I exhibited it before our society meeting, I was hardly prepared to see it so extensively noticed.

To save me writing, I enclose for your perusal some notes about the cuckoo and other birds I had intended to send to a local paper, but have not done so as yet.

I had not consulted Lord Lilford's book to which you refer, but there is no doubt that this bird gives the true cuckoo-call ; there is no chirping about it.

I had a letter from the editor of the *Sketch* asking for a photo of this bird. I had one taken, and it should appear in that journal shortly, but, as the bird was in very poor plumage, it does not make a very pretty picture.

If there is anything further you would like to know about the bird, I will be very happy to give you any information I can, and you might kindly return my notes with any criticism regarding it, which I will value as coming from an experienced writer.

I am,
Yours very truly,
CHAS. CAMPBELL.

Alex. H. Japp, Esq., F.R.S.E.,
London.

The following are Mr. Campbell's notes:

A CAPTIVE CUCKOO.

"One day last summer, while in Mr. Cochrane's bird shop in Market Street, Edinburgh, I was surprised to see a cuckoo disporting itself in a cage quite at home. As it has always been a debated question whether a bird with so strong a migratory instinct as a cuckoo would long survive captivity, I was much interested in the specimen and naturally desirous of knowing something more of its history. There is, of course, always a feeling against keeping any wild bird in confinement, but, given proper treatment, there is much that may be said in favour of making pets of our own wild birds that does not apply in equal measure to birds imported from abroad.

"In August, 1894, there was some correspondence in the *Scotsman* as to the late occurrence of the cuckoo in Scotland, and I then stated that I had every reason to believe that a belated specimen of the cuckoo was seen in the woods of Moredun, in Argyllshire, as late as December, the weather being that year exceptionally mild. Another correspondent wrote saying he did not believe this, and quoted from Mr. Speedy's book, *Craigmillar and its Environs*, as proving that our climate is incompatible with the existence of the cuckoo in winter, and the bird Mr. Speedy describes in that interesting book did not survive beyond October; but Mr. Cochrane's pet had already survived two winters. In the cold weather it is taken from the shop to Mr. Cochrane's house, where I went to see it a few nights ago. When I entered the house, the cuckoo was perched

near the fireplace at liberty. It readily picked a mealworm given to it, and exhibited no fear at the presence of a stranger. After a look round at some other pets, I enquired more minutely into the history of the cuckoo. It was taken from a titlark's nest in Wigtonshire when very young, and hand-reared. One of the great secrets of success in bird-rearing is, of course, to know the proper food. A small piece of raw meat it regards as a delicacy; in the season it has a little chopped lettuce, or some grated carrot mixed up with some kind of meal in which there may be also a sultana raisin or two.

"Last year the cuckoo moulted in February, and it is in the same condition at present. After it was through the moult last year, much to the surprise of its custodian, the cuckoo commenced its well-known call, and continued crying till July. This is a very rare occurrence, and I am not aware of any previous instance of the cuckoo giving voice in captivity.

"About the end of July it began to exhibit a restlessness it had not previously shown. That it felt warning of its migratory instinct impelling it to fly to a more congenial climate was very evident. After a time it quieted down again, and began to moult its feathers a second time. The cuckoo this year commenced to cry on the 7th of April, exactly a week earlier than last year. The note last year was clearer and firmer than it is this." *

At the risk of seeming to repeat a little on a point or two, I am tempted here to give a portion of a letter written to me by Mr. Cochrane, in answer to

* Mr. Campbell's article appeared in *The Scotsman* and *Edinburgh Evening Despatch* of April 28th, 1898.

one of enquiry from me, about the death of this remarkable bird—the more especially as it utters so simply and so well the feelings of a true bird-student and bird-lover. The date of Mr. Cochrane's letter is December 12th, 1898.

"I regret to say that poor cuckoo is dead. He died about two months ago. He seemed to become gradually paralysed on one side, and was found dead

THE RECORD TAME CUCKOO.

(By permission of Mr. Balmair, Edinburgh.)

one morning. I may say that his eye was bright, and his voracious appetite unimpaired up till the last. I believe *The Sketch* had an article on him, and also reproduced his photo, though I did not see it—the *Sketch* paragraph, I mean; I have a copy of the photo taken for the *Sketch*. I regret very much that I did not have his photo taken when he was in good condition and feather. At the time his photo *was* taken (sitting on my hand) he was in wretched feather. His plumage was perfect up to his first moult, and until the migrating season came round, when he became, for a week or two, very restless, and kept continually jumping on to the wires of his cage, thereby breaking all his flight and tail feathers. I may here say that I never came across such brittle feathers in any bird. There was no pliability in them —they snapped like dry twigs.

"During this summer I had a bird which had been shot brought to me to identify. It was a young cuckoo, and its feathers were not nearly so brittle as my own's were; possibly the feeding of my one in captivity had something to do with it.

"He was taken from the nest of a meadow-pipit, in June, 1896, and commenced his well-known call in May, 1897. Some days he would call incessantly from daylight till dark. He ceased calling in July, I think, and remained mute till the evening of April 9th, 1896. I remember the occasion well; it was about 9 p.m., and he was sitting on the fender, enjoying the heat of the fire. (He had the run of the house at this time.) During 1897 his call was an ideal one; just the same as if he had been at liberty in the woods; while in 1898 his call was entirely

different and disappointing, and not at all pleasant to hear, neither did he call so often.

"His food consisted of meal worms, principally, of which he ate seventy-three, one after the other, on one occasion. He took them all from the hand, too. He also had made up for him daily, minced hard-boiled egg, minced lettuce, grated carrot, grated boiled liver, and ants' eggs, all mixed together. He was also very fond of small pieces of raw meat. He had also on one occasion a feed of very small live frogs, which he seemed to appreciate very much. I have heard people say that cuckoos ate other birds' eggs. Well, I put small birds' eggs into his cage repeatedly, and he would never touch them. He was a very intelligent bird, and made friends with everybody. He would fight playfully with your finger; putting out his wings and pecking vigorously, and uttering all the while a sort of guttural sound from the back of his throat. He would never take a bath. Once or twice I gave him a shower-bath, but he just sulked in a corner till he was dry again—never offering to dress or preen his wet feathers, as any other bird would.

"It has never been in a position to hear the note of its wild companions, but has been reared among the shrieks of parrots, the piping of bullfinches, and the trilling of German canaries. On one occasion, when the parrots were screaming in chorus, the cuckoo commenced calling vigorously, and, to the astonishment of its owner, it soon had the field to itself, for the parrots, by common consent, seemed to stop and listen."

This experience, though it is opposed by that of

Lord Lilford, seems to confirm this sentence of Father Gerard:

"One argument to the contrary nature has exhibited in the cuckoo, which, reared in the society of strangers and with their notes in its ear, yet sticks unfalteringly to the tune, which only by instinct can he recognise for his own." *

For later eggs deposited, as many eggs are in the nests of birds in later June, even in later July, it is impossible that the parent notes could ever have been heard by those young birds, for they would not be hatched till after the old birds had become silent, if they had not departed.

In Mr. Cochrane's case, then, we have a complete reversal of Lord Lilford's experience all along the line, as we may say, and must hold our decision in reserve till we have more evidence.

And we may therefore meantime find some ground for agreeing with Mr. Hudson:

"It is possible to believe that, while many singing birds do learn their songs and acquire a greater proficiency in them from hearing the adults, in other species the song comes instinctively and is, like other instincts and habits, purely an 'inherited memory.'" †

We have record from another good authority of a third cuckoo kept in confinement, which lived over one year, and in this case, though there were decided efforts to make the cry "cuckoo," it never really got beyond the first syllable "cuc," and sometimes even failed to render that with any degree of distinctness.

The matter can only be settled by careful experi-

* *Science and Romance*, p. 23.

† Naturalist in *La Plata*, p. 257.

ment and observation. At present we have but case against case, and we can only safely generalise from a larger body of particulars. There seems to be no doubt about Mr. Cochrane's bird, and the case is all the stronger inasmuch as he is so well assured that it could never have heard the note of the free birds of its own kind. We must wait for more light on the subject and meanwhile reserve our opinions.

These two cases and one other show advance made in treatment and success with confined cuckoos, since Mr. Stevenson tells us, as though it were remarkable, that Mr. Dew, a hairdresser in Norwich, kept one in perfect health from June, 1863, till some time in October, 1864—that is sixteen months—through one winter.

Mr. W. H. Jack tells of a tame cuckoo which haunted the bushes about his house, clearing them of the larvæ of *Orgyia antiqua*, the common vapourer moth. It took up its abode in the front garden, was regularly fed, and grew quite fat. A pole was put up for it, which it took to, and was often seen, when the ground was wet, to dig up worms, like a thrush. *Zool.*, 1890, p. 457.

A most important further point with a bearing on this matter is made clear in the following note from Mr. C. A. Witchell, published in *Knowledge*, who has made a very close study of the development of bird-song, and written most effectively on the subject, both in a well known volume and elsewhere.

"It seems to me that the missel thrushes near Eltham sing longer strains than are heard from those of Gloucestershire, and that the latter birds more frequently utter a few high broken notes after the

strain, in the manner of a blackbird. It would be interesting to learn whether anyone has heard the missel thrush sing a long strain, such as one hears from the blackbird. This point appears to me important in connection with the fact that the young blackbird, when commencing his full-toned song, utters short strains, like a missel thrush."

Mr. Witchell's closing words there raise the whole question we have been asking about the young cuckoos. Do the young birds instinctively sing the song exactly after the type of that sung by the parent bird, or do they catch up what they may most hear, and begin with that; or do they in their song, as in other things, sometimes show back-strokes—fallings back on the habits of relations long differentiated, and ranked now in a distinct, though related family; or is it possible that intimacies of a peculiar kind are possible and more general than is ordinarily believed between members of those related families? These are matters on which there is still much to be learned, and which can only be learned by the observations of close observers in different parts being systematically reported and compared. Here, for example, is a letter written by the Rev. Vere Audry, and published in *The Spectator* of April 25th, 1898:

JOINT-STOCK COMPANIES AMONG BIRDS.

"Is this conduct usual, and can any of your readers throw light upon it? In this garden a thrush is sitting on a nest of blackbird's eggs, now just hatched. The nest is a blackbird's, the eggs were a blackbird's, but a thrush sits upon them; a cock

blackbird sits in a branch just above and sings to the sitting bird. What can this mean? One might have supposed that somebody had changed the eggs were it not for the cock blackbird sitting above. There is no mistake about the facts; the nest is close to the path, and we watch the performance every day. There is no nest that we can find in the neighbouring bushes.

"Two years ago a child then staying in the house reported exactly the same facts as having happened in a bush on the other side of the path; but no attention was paid to what he said, as he was a mere child."

Now, if this is possible between the common thrush and the blackbird, who, though relatives, are not always very affectionate towards each other, might this not happen now and then with the missel thrush and the blackbird. I had an experience of my own precisely in the direction of that of Mr. Audry, but should not desire to base upon it. Has Mr. Witchell extended his observations widely enough to be certain that the short strains like those of the missel thrush are invariable with the young blackbird? That point settled, generalization there would be easier. But so much goes to modify these things—locality, as Mr. Witchell tells. Eltham missel thrushes sing longer strains than those of Gloucestershire, etc., etc.

Mr. Robert Read and other practical ornithologists have frequently found two hen birds laying in one nest. Mr. Read, for example, once found eight thrush's eggs in a nest in a wood near Durham, which from their colour he judged to be the product of two females, as there were two sets of four each.

He has found four spotless eggs and one normal one in the same nest. The occurrence of the eight eggs together, apparently laid by two hen birds, is interesting, as it is known that occasionally the birds build two nests in conjunction.* Everyone knows that pheasants will often lay eggs in partridges' nests and in effect sometimes share the brooding with them.

It is a notorious fact that building in the same tree or near to each other disarms egg-suckers; thus pigeons have been found building on the same trees as magpies and jays, and in most of these cases it was found that the pigeons' eggs escaped the natural marauder so near to them. So, with birds, not distantly related, building close to each other might well lead in time to the sharing of one nest.

All, however, bears more or less directly on the central question of birds' song, whether instinctive, hereditary or imitative and learned by listening to other birds' notes: a whole lot of birds imitate the songs of other birds, and by it very materially modify their own—thus thrushes and yet more blackbirds and starlings imitate the song of the nightingale, and sometimes so perfectly up to a certain point that their song might well be mistaken for the nightingale's. Light is much needed on this point, and it can only be secured by ornithologists in one part taking up special lines of enquiry and observation, and corresponding with those in other parts; so that, from a wide range of observations, general laws may be reached.

One experiment I propose to myself on the first

* Dr. Bowdler Sharpe's *British Birds*, p. 266.

chance offering. This is to put a cuckoo's egg, taken from the nest of meadow-pipit or hedge-sparrow under a canary hen or other caged bird along with hers, modifying her food as far as may be in favour of the cuckoo, then to watch how the cuckoo conducts himself towards the young, as also how he developes notes and song. I should be pleased if others would try similar experiments, and put themselves into communication with me that we may compare notes.

A correspondent of the *Anti-Jacobin*, who there recorded some very nice natural history observations, made these remarks about a variation in the cuckoo-note heard by him :

" Twice only and that in the same part of Lancashire have I heard the cuckoo pause on his first note —*cuck-oo cuck*, and so abruptly terminate. Probably some insect came within clutch of his beak and stopped his song, with the hope, as Horace says, of *plus dapis*. *Apropos* of cuckoos, a lively little boy, bred among Mayfair chimney pots, was taken to a country haunt for the first time of conscious observation, and hearing the fond bird calling its own name, with which sound he was previously familiar only through a cuckoo clock on the stairs of his home, turned a face of childish surprise to his nurse and exclaimed among the hedgerows, " But where's the clock ? "

Mr. G. D. Leslie to Mario, under date 27th June, 1889, writes :

" The cuckoo, which has been singing for the last eight weeks, has begun that absurd alteration in his notes which is a peculiarity of the bird ; he no longer says cuckoo, but cuck-cuckoo and cuckoo-cuck.

There has been a good deal of debate about whether the cuckoo ever calls when on the wing. I am confident that it does so when mating, and in pursuit of the hen, as many other birds do that sing not on the wing at any other time; canaries being among them. I have seen and heard it thus many times: and then, I can assure the reader, there is no mistake about its note. And since writing the above I am glad to have this confirmed by the observation of a good authority, who, in the *Zoologist* for 1894, pp. 306-8, says:

"When mating the cuckoo most decidedly calls when flying after the hen."

Mr. A. Holte Macpherson, in writing of the note of the cuckoo, however, tells, that while other birds in their courtship actually lose their senses, and their heads, the cuckoo always seems intelligent, and to hear all neighbouring sounds." *

Yarrell thinks that the notion of cuckoos sucking eggs,—their own, or those of other birds,—arises from their undoubtedly carrying their eggs in their mouth; a fact which has been so fully observed and verified that there can be no doubt whatever about it. But from various facts and suggestions we have given —it is clear that the piercing and sucking of eggs is now common to certain species of cuckoos, and phenomena observed in the case of others would almost justify one in saying that it is in no way so absolutely proved that even *Cuculus canorus* never condescends to prick and to suck eggs; though, in our idea, it is more than possible that modification of food in his case, owing to changes in land culture, etc., etc., and his reliance more and more on a sort of food, which,

* *Zoologist*, 1896, p. 337.

inside him, does not accord with the egg substances, has led to his generally abandoning the practice—abandoning it, save in the exceptional circumstances connected with deposition of his own eggs, etc. But where he pricks eggs, it is more than possible that he tastes them.

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