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Birds

PRACTICAL
BIRD-KEEPING.

EDITED BY

J. LEWIS BONHOTE, B.A.

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PRACTICAL BIRD-KEEPING.

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Birds

PRACTICAL :: ::

BIRD-KEEPING.

BEING REPRINTS OF ARTICLES
:: WHICH HAVE APPEARED IN ::

“The Avicultural Magazine,”

JANUARY, 1911 — DECEMBER, 1912.

EDITED BY

J. LEWIS BONHOTE, M.A., F.L.S., F.Z.S., M.B.O.U.

London :

Messrs. WEST, NEWMAN & Co.,
54, HATTON GARDEN, E.C.

1913.

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PREFACE.

This little Manual of Bird-Keeping is intended as a practical help to those who find both pleasure and profit from the keeping of Wild Birds in confinement. The articles which have appeared month by month in the pages of the *Avicultural Magazine*, are by various authors, each of whom is a specialist in the groups with which he deals, and our best thanks are due to those ladies and gentlemen who have so freely and unreservedly placed the results of their experience at our disposal.

We have added a List of References to the various more important papers, that have appeared in the past numbers of our Journal, so that those specially interested in any particular group or species may be able to read up the subject at greater length. That a book on Practical Bird-Keeping is required, will be acknowledged by all, who from their official position or some other cause, receive among their daily correspondence, letters asking for information on some of the most common and easily kept birds. It has been the aim and object of these articles to supply that need, and we may fairly claim this to be the first book on the subject in which every chapter has been contributed by a specialist.

THE EDITOR.

HEMEL HEMPSTEAD,
December, 1912.

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INTRODUCTORY NOTE.

**SOME GENERAL PRINCIPLES OF
BIRD-KEEPING.**

By AUBYN TREVOR-BATTYE, M.A., F.L.S., F.Z.S., M.B.O.U.

Some of our friends who, fond of birds, have as yet had no experience in keeping them may find it a help to hear something of the general principles of successful management.

This means something more than merely keeping birds alive; it means keeping each one in that condition of perfect health, and as far as may be of perfect activity in which the bird would be if in the wild state. It is quite possible for a bird to remain alive in captivity for years, and yet never to be really in a condition of perfect natural vigour.

A bird, if it is below the mark, may live and may even nest, but it will not breed. The thoughtful aviculturist, then, constantly refers in his mind to the home life of any given species, so far as he knows it, and asks himself whether he has as fully as is possible under the circumstances, reproduced those conditions. We cannot all go off to far countries to study wild birds there, but there are many books, and we have always the analogy of our own wild birds to help us.

Light or darkness, quiet or noise, space and shelter, are all important factors, but none of them have the extreme importance of Method, Cleanliness and Feeding.

METHOD. Now and then one comes across a collection where everything goes haphazard; where things are done 'any-how.' Cages or enclosures are dirty; food is chucked in at odd times and in indiscriminate handfuls; the food of other days is

stale upon the ground ; water vessels are dirty and the water foul, if not forgotten altogether. He who leaves things thus to chance had better not keep birds ; it is not his line.

Method involves regularity and thoroughness. The same thing should be done each day at the same time. With a definite hour to which to look forward, the birds will each day be in the same state of preparedness, their food will come at the proper interval after the last supply, and those birds that only feed once in the twenty-four hours will be sharp-set and ready for their meal ; the sitting bird will often leave the nest at feeding time, while mates that sit alternately will be inclined to make feeding time an occasion for the change. Regularity applies to cleaning as well as to feeding. Since birds have to be disturbed for purposes of cleaning, it is best that this should be done at stated hours, so that they may have the same daily period of non-disturbance and may come to know exactly "where they are." Their keeper should move about in the aviaries in a methodical manner, and always as far as possible move in the same way, and should make no sudden or startling movement. A most useful practice is, always before entering an aviary or enclosure, to make a quiet whistle or other sound in order to prepare the birds for a visitor ; only it is well always to make the same whistle or the same sound, and they will soon learn to connect it with the coming of a friend. One might almost go farther and say it is well always to wear the same coat and the shabbier the better. (Birds have a great dislike to black coats and white linen).

CLEANLINESS. Insistence on this point one might suppose to be little needed, but it is not so. One sees but too often aviaries and cages that are very far from receiving the attention they properly demand. In the best-managed of the large collections known to the writer—that of the Emperor of Austria at Schönbrunn—cleanliness is carried to such a degree that keepers (they are women) clean each day with sponge and water even the twigs of the enclosed trees or shrubs. This is a counsel of perfection that we may not all be able to follow. But we can at least see that perches are kept clean ; that new boughs are supplied when the bark is worn off the old ones ; that no refuse nor

debris is left lying about; that the trays are freshly sanded, and that the turf is trimmed and earth raked over; that moulted feathers are picked up, and also that, as far as possible, all *excreta*, including the castings of raptorial birds, shrikes, etc., are removed each morning. Then there are food and drinking vessels to be scoured with boiling water, and no duty is more urgent than this. If there is not sufficient time or sufficient money to allow of this being done every day, then too many birds are being kept. It is infinitely better to keep one pair of birds really well, than any greater number in a careless way.

FEEDING. The naturalist who travels gets to know a good deal of the economy of the different birds he meets with in his wanderings; to learn what are their natural hours for feeding and what their favourite form of food. This knowledge is all to the good—he can apply it should these foreigners come into his hands. But so many genera of birds, having foreign representatives, are familiar to us in Great Britain that a pretty shrewd guess at the habits of one foreign bird or the other may often be formed by those of kindred species at home.

Birds feed in very different ways. Birds of Prey have often to hunt long for their food, and sometimes have to go entirely without food for very many hours; after they have gorged themselves it may be twenty-four hours or more before they can feed again. The falconer therefore feeds his birds on this principle; he lets them at stated intervals miss one day's food altogether, and then again will give them as much as they can eat. Whether our aviarist keeps eagles, hawks or owls it is useless to feed them until the casting from the previous meal has been ejected. Birds of Prey at feeding time should always be sharp-set and ready to pounce at once on the food offered to them. They should never be given more than they can clear up at one meal, for nothing is worse than to have stale flesh lying about in the cages; stale meat may induce ptomaine poisoning and death. The food should be varied as much as possible; the changes may be rung on rats, mice, rabbit, birds, and even chickens' heads. When all these fail and beef steak is resorted to, some fur or feather must be swallowed with the meat, for this is very necessary to their health. Partridges, pheasants and

their allies make their principal meal, as every sportsman knows, in the morning and evening. Insectivorous birds and seed-eating birds, such as finches, feed on and off all day. A supply of food must, therefore, be always left within their reach. The principle on which these birds feed is "little and often"; they pick up a bit here and a bit there as they feel inclined.

In feeding, the great thing to aim at is variety; have some one staple food and vary it with others as much as possible. As it is difficult to get insects, several patent "insect" foods are in the market; ant-pupa and yolk of egg form the basis of some of these. A good many insect-eating birds, and of course many others, will take fruit, but this must be given with discretion. A hint may be taken from the gardener's list; the fact that such widely differing species as the jay, hawfinch, blackbird, titmouse, and whitethroat attack fruit, will suggest that fruit may be given in its season and green food all the year round. Yet common sense will dictate care in such food in the case of birds in small cages, who are debarred from much exercise and also from finding the great variety of food at command of the wild bird, when one food may neutralize another that might otherwise be injurious.

In the dietary of many birds few things are more important than grit and salt. Every bird that possesses the grinding mill called a gizzard, requires a supply of grit for the proper trituration of its food. In larger birds, such as pheasants, quartz chips will be used, while little birds will pick up grains of sand.

We all know the importance of salt in a human being's food. It is important for two reasons; because being an alkali it neutralises undesirable acids apt to be created by decomposition of food, and, further, because it goes to the formation of hydrochloric acid, an active agent in digestion. Birds that feed on the ground require salt especially and should always have a lump of rock salt lying on the gravel of the enclosure; the salt will melt and the birds will pick up the saline grit.

HEALTH. Given proper attention to food and cleanliness, there still remain points that are of scarcely less moment. Among these are bathing and dusting. All birds take a bath of some kind, some in sand or dust, some in water, and others

in both. The opportunity for these is, therefore, very necessary to their health and comfort. Falconers know, for instance, that their hawks will not fly well unless they have had their morning bath; in seeking other means of getting cool and clean they will be apt to soar away out of sight and will perhaps be lost altogether. A large bath of clean water must be provided for all birds of prey, and for all kinds of gallinaceous birds large heaps of sand or dry earth. Even the little passerine birds must have enough sand to dust in, and a water vessel large enough for a satisfactory bath. Birds differ much in their hours for bathing; some like to wash in the morning, others not until the sun is warm, others again—our own robin is an instance—wash quite late in the evening. But it is best to try and get the washing over before the day turns cold, that feathers may be thoroughly dry by bed-time.

It is good to devise means for giving birds occupation, for the more they can be kept amused and occupied the better will be their health. When one comes to think of it, although birds bred in captivity, who know of no other existence, may be quite contented, aviary life must be pretty dull for any bird that has once known freedom. The more they have to work for—to search for—their food the better; it is better for a finch to be pecking seed out of a millet spray than taking it from a food vessel; it is better for a falcon to have to pull hard at its food than to be supplied with little pieces it can easily swallow; it is better for scratching birds to have to hunt for a portion, at any rate, of their food in sand gravel or mould than always to find it all lying in a heap in the open.

It requires but little observation as a rule to tell when a bird is out of sorts; it shows this by ruffled feathers, a tucked-up look, half-closed eyes, neglect of food, drink or bath, and listless movements. A sick bird does not shake itself. The bird that is well has its feathers close-set to its body and looks "hard."

Provided birds are well, and well fed, it is extraordinary how great a degree of cold most of them (even from warm countries) will stand. Frost affects them but little or not at all. But two things no bird can stand: the first is a draught, and the

second is to be wet and cold, or what is still worse, wet, cold and empty at the same time.

The bird-keeper gets to know by very trifling signs whether one of his charges is off-colour even to a slight extent. He will often have a shock over this matter; coming upon a favourite bird standing with half-closed eyes and feathers all on end, a wave of anxiety will pass over him; but the bird shakes itself and the anxiety is relieved—it was only feeling sleepily happy in the sun.

NESTING. Given that a pair of birds are in perfect health, one of two conditions is necessary if they are to mate and successfully nest; they must either have quiet surroundings or else a publicity so complete that they are quite indifferent to noise and passers-by, as in our London Zoo. for example. But the amateur in the country cannot secure this state of things; he must therefore do his best to see that ladies who visit his aviaries do not wave coloured parasols, nor children come quickly round corners in fluttering frocks, nor dogs rush about near the birds and bark. One single panic may destroy the efforts of years. Whether the aviaries are sequestered, or are placed where crowds will visit them, one thing is absolutely imperative—the actual site of the nest must be undisturbed. It goes without saying, that site and material, as much as possible like those natural to the species, must be provided for the birds.

AVIARIES. A good position for the front of an aviary is facing south-east, the worst is facing south-west. Birds, like trees and plants, thoroughly dislike a south-west wind. With a south-easterly aspect the birds get the benefit of the early morning sun—and an incalculable benefit it is.

A word now about Shelter. Let us go back to the wild bird. A bird in its wild state is free to choose that shelter from wind and sun at will; finches may go into the bushes, sparrows to the eaves, birds of prey to the shelter of the rock, ducks leave the sea for the shelter of the banks and reed-beds of inland waters. Shelter in an aviary is most important, and, fortunately, can easily be provided by bushes and screens.

Birds must be able to get away from observation should they want to do so. On the other hand, the shelter must not be

too dense or not only will they be difficult to see, but will tend to keep too wild.

There are two principal forms of Aviaries, viz.: the Enclosure and the Covered-in Aviary. There is also an ideal aviary which partakes of the nature of both. This would have its building, and in addition, a large flying aviary, of anything from, say, twenty yards to a quarter-of-an-acre in which trees and shrubs were entirely covered in by wire netting. But as such a place is out of the question for most of us, we will here confine ourselves to considering the two referred to above.

THE ENCLOSURE. This is designed for pinioned birds of various species; chiefly for birds that spend much of their time upon the ground; for wading birds—herons, cranes, flamingoes, for “waders” proper, bustards, pheasants, partridges, tragopans, etc. As much ground as can be spared is enclosed in a wall of wire netting some eight or nine feet high. The netting is sunk in the ground to prevent the entry of rats, is of small mesh to stop stoats and, if possible, weasels (the male weasel is hard to stop) and has the top flanged out for about a foot or fourteen inches to stop cats and foxes. It is sown with light grasses that will not grow rank or keep wet (*Festuca ovina v. tenuifolia* is the best) and with any seed bearing plants likely to be useful. Bushes are also planted in it for covert. If water can also be enclosed so much the better, the ideal thing is, of course, a little stream. Dusting places are made in it, protected, if possible, from the rain. Mounds are built up because they amuse the birds: many birds are fond of running up and down a mound or bank, and they like to stand on the top and sun themselves there at dawn. Bustards delight in running up banks and then opening their wings and running down again, flamingoes will get on to a bank and stay there with outstretched wings when the wind blows; partridges and pheasants love stretching and dusting in a bank. There should also be a good area of gravel on which birds may stand on wet days and from which they then pick up grit. Care is needed to protect food vessels in an enclosure from rain and from sparrows; the first is easily done with a lidless box stood on its side, the second will tax all the keeper’s ingenuity. There is no guide to the size of such an

enclosure except this—that it should be sufficiently wide for a bird, when standing in the middle, to feel itself in a position of safety from visitors who may be passing at the same time along both sides of it. In the enclosure will stand the hut into which bustards or cranes or flamingoes can be walked on occasion, trees on which pheasants can climb and sit, and any shelter that may be required for other birds. Such are a few points about enclosures.

THE AVIARY. Aviaries may be made—of course they are made—in various ornamental manners. For certain tropical birds they need heating, or half-heating; for certain other tropical birds they need artificial light on winter days. The writer having had no personal experience of these, and conceiving an “ornamental” aviary to be an abomination, will merely describe here the pattern of aviary used by himself for hardy birds, and one that absolutely simple in design and construction, seems to him to be practical and sufficient.

The outside enclosure measures 12 feet long by 8 feet wide and 7 feet high; inner house 8 feet by 6 feet. The framing of the outer part is of creosoted deal 3in. by 2in. The wire-netting covering is 6ft. wide and is of $\frac{3}{4}$ -inch mesh. (If the very smallest birds are to be kept it should be $\frac{1}{2}$ -inch). A double width of netting then exactly covers the top and sides: a single width the front leaving a space of 12in. below it. (It will be obvious that the view through the front will therefore be clearer than that through the sides, since the netting will run in the opposite way, and for normal eyes horizontal lines are better than vertical). The space between the bottom of the netting and the ground is made out with boarding. It is best to have this 18 inches deep

as this prevents small dogs and passing cats from alarming the birds ; it also affords shelter to birds when on the ground. The house part is of creosoted or "salignumed" board, with an entrance door at the end. The roof is 3 feet vertically from eaves to pitch ; it is thatched with heather or straw. Nothing makes so good a roofing as these—for they are cool in summer, warm in winter, and offer convenient nesting-places. The outer part has a grass lawn in the middle and a gravel path round ; the flooring of the inner part may be of earth or sand. The opening of the front of the house is partly closed by a screen. As many of these as is desired can be built side by side. It is a good thing to have the entrance door where shown, because when anyone enters the birds will not get cornered, but will fly out into the outside.

I.

THE CULTURE OF FINCHES.

By Dr. A. G. BUTLER.

The Editor has suggested that I should contribute a paper upon this subject for the benefit of beginners in aviculture, and although I do not profess to know more about these birds than many others of our members, the fact that I am the author of "Foreign Finches in Captivity" probably induced him to select me for the task.

Finches are not my favourite birds, although they are tolerably easy to provide for; they are neither so easily tamed as a general rule, so intelligent, or so long-lived as so-called "Soft-billed birds" still they are very beautiful and many of them are easy to breed in captivity. They are all seed-eaters, but most of them eat a certain amount of living insect-food, especially when breeding; many of them feed also upon the green seeds of grasses, buds, small fruits and berries, and the leaves of weeds, but especially chickweed and groundsel.

The Finches, as is well known, belong to two large families—*Fringillidæ* and *Ploceidæ*; the former having the bastard-primary shorter than its coverts, the latter with it longer. The *Fringillidæ* are related to the Larks and in a lesser degree to the New World Starlings. The *Ploceidæ* in my opinion form a link between the true finches (*Fringillidæ*) and the New World Starlings (*Icteridæ*).

The most insectivorous of the finches amongst the *Frin-gillidæ*, are the Buntings, some of the Grosbeaks, the Chaffinch group and the various forms of Sparrows, the Weavers and Whydahs amongst the *Ploceidæ*; but during the winter months all these birds thrive without insect-food. With these general remarks respecting food we may for the present leave that subject and pass on to the housing of finches.

Undoubtedly, like most other birds, these also do best when kept in spacious aviaries having both an indoor and outdoor compartment; the indoor portion should be fitted up with natural branches, the walls being partly decorated with nesting receptacles of various kinds—old straw-hats with a round hole near the edge of the crown and tacked to the wall through the rim so as to leave the hole at the highest point, cigar nest-boxes, converted travelling Hartz-cages, ordinary square Canary nest-boxes, wicker-cages with the door removed, large Weaver-birds' nests, or any other appliance suitable for finches to build in.

If delicate birds are kept, this inner compartment should be provided with hot-water pipes and sliding panels to shut it off from the outer flight during the winter months, the birds being all driven inside in the autumn and allowed egress again only with the coming of warm weather; but it is better for beginners not to attempt to keep any but hardy birds, passing on to the more tender species when they have gained experience. If the outer compartment or flight is sufficiently large, it is better for it to be as wild and natural as possible, bushes, trees and creepers being grown all over it with the exception of a central more or less winding path for the convenience of the owner. In such an aviary many finches will nest in the shrubbery without difficulty and often without the owner's knowledge provided that soft food containing egg, dried ants' cocoons, etc., with chickweed, are supplied daily, the parents finding sufficient small insects, caterpillars and spiders amongst the grass and bushes around them.

I have found it far more difficult to breed finches in cages than in aviaries, although some aviculturists have had the opposite experience; but there are a few common species which can generally be depended upon to reproduce their kind under either condition, such as the Saffron-finch, Java Sparrow, Ribbon-finch,

Zebra-finch, Bengalee and Sharp-tailed finch; the Grey and Green Singing-finches will also build and hatch their young in cages and have been known to rear them: I see no reason why all the Serins should not be bred in cages although I have not myself been successful with them. Our British Goldfinch will breed both in cage and aviary; I have myself bred it in the latter enclosure and have bred mules between it and a Canary in a large cage.

This brings me to another point with regard to the indoor culture of finches and indeed of all birds in close confinement; none of them should be permanently kept in cages which are too small for them to use their wings as freely as their legs, or to indulge in a bath whenever they are inclined to do so. Nothing is more conducive to the health of a bird than plenty of natural exercise, and cleanliness combined with fresh air.

The small stuffy cages formerly in use with seed and water hung outside and no exercise beyond a monotonous pendulum-like hop from upper to lower perch were most injurious to the health of their inmates, and more especially when their cages were hung up in a close gas-heated room and were not frequently cleaned out. I have found a cage about three feet long, eighteen inches high and eighteen inches from front to back, open only in front and with a central sliding door, none too large for a pair of small finches, if one has any wish to breed from them. There should be a metal tray sliding in from the front, a nest box in the centre upon the back wall close to the roof of the cage, a perch from front to back high up near each end and a pan of water on one side of the door, a pan of seed on the other. When breeding a small pan of soft food should be added and green food stuck through the wires near one of the perches. Hygienic fountains are cleaner than open pans, but the birds cannot wash in them and if both are supplied the birds, like human babies, will always drink from their bath.

Some aviculturists have been successful in breeding the commoner Waxbills in cages, but with me they never attempted to build excepting in a good-sized aviary and even then I never succeeded in getting them to hatch their eggs. The same is true of most of the Mannikins, though they are more ready to build

and sit than the Waxbills but are so nervous that with the least alarm they spring up from the nest, kicking their eggs right and left in their excitement.

According to the late Dr. Karl Russ the Waxbills require living ants' cocoons when feeding their young, but in a large well-grown shrubby outdoor aviary I suspect they get a sufficient quantity of tiny insects to meet the requirements of their progeny.

The Cardinals will build in an indoor aviary and also lay, though they do not always do so in the nests they have constructed, but often smash their eggs by dropping them from a branch on to the floor; in an outdoor aviary, however, they succeed far better, only they require abundant living insect food from the day that the young break the shell until about a fortnight after they leave the nest, and the quantity which each youngster eats in a day is generally so considerable that the supply fails and the young are thrown out of the nest, perhaps one alone being retained by its parents.

Finches always feed their young at first from the crop, but the more insectivorous kinds begin to feed with crushed or broken up insects when the young are only a few days old, though even then they sometimes give them the food in a partly digested condition: the young thus get triturated seeds, green food and insects combined in a moist and easily assimilated form: some of the larger finches also give broken-up earthworms, a repulsive looking article of food which I have seen the Pine Grosbeak devour greedily.

I must now say a few words respecting the seeds which I have found most suitable for the commoner kinds of finches. For the more typical Buntings, Chaffinches and Sparrows a mixture of Canary, white millet, German rape, hemp, oats and perhaps a pinch of linseed occasionally, serves admirably; but for the Cardinals I have found canary, oats and hemp most suitable with a little apple or other fruit when they will accept it; sometimes they will not touch fruit.

The Serins and our English Linnet with its allies do well upon canary, white millet and a little German rape or, when moulting, a pinch of hemp: they all delight in green food, for

H. Goodchild del.

THE MELBA FINCH
(*Pytchea melba*).

which the Buntings as a rule do not care much ; they are also, perhaps, the least insectivorous of the true finches, though they will accept small green caterpillars or green fly : Goldfinches and Siskins, but especially the latter are eager for this kind of food and need a more liberal seed-diet ; thistle, teasle, and hemp, with an occasional pinch of maw-seed being much appreciated by them.

The Grosbeaks, with a few exceptions, care little for green food, but the larger forms require a generous seed-diet ; sun-flower, beech-mast, hemp, millet, canary and German rape forming a good general mixture ; berries are also eaten by some of them ; but the smaller forms, of which the White-throated finch may be considered typical, do well upon white millet and a little canary seed. Waxbills, in addition to the last-mentioned seeds like spray-millet and grass-seed in the ear, both in the milky and ripe stage. The Grass-finches should be treated like Waxbills although some of them never touch green food and merely use the grass-stems with their seed-panicles to build with. The Maunikius also with the exception of the Java Sparrow which likes oats or paddy rice in addition to millet and canary, should be similarly treated.

The Weavers and Whydahs eat oats and hemp as well as millet and canary and, as previously stated they are eager for insects, their larvæ, and spiders. The Long-tailed Whydah will eat cockroaches at any time as also will the Grenadier and other large Weavers. I have never seen one of these birds eating green food.

For nesting materials hay is the principal thing, to which may be added feathers, fir-needles, cow-hair, coarse cocoa-fibre, and moss, with white wadding ; but many of the finches use hay alone in the construction of their nests. Do not forget to supply nesting birds with abundance of cuttle-bone, crushed up egg-shells or old mortar, to lessen the chance of egg-binding ; and remember at this period to supply a pan of soft-food daily with plenty of living insect-food when necessary.

It is better, even in the case of birds coming from the Antipodes, not to encourage them to breed during our winter although in a heated aviary, for the young then produced are liable

to be affected by sudden falls in the temperature characteristic of our very depressing climate and grow up weakly when they survive at all. My Gouldian Finches would not attempt to nest earlier than July and I had no young earlier than September, so that there was barely time for more than one nest in the season, but Zebra-finches will breed all the year round if provided with nesting-materials.

II.

THE BRITISH WARBLERS.

By W. E. TESCHEMAKER, B.A.

I sincerely wish that this subject had been allotted to some more experienced aviculturist than the writer, because undoubtedly the treatment of the *Sylvinae* in captivity presents special difficulties of no mean order, and there is considerable divergence of opinion as to the most suitable methods of feeding and housing. Nevertheless, having some time since promised our excellent Editor any small assistance that I was in a position to offer, I felt that I must not fail him the very first time I was called upon.

I shall make no excuse for endeavouring to point out the principles involved in the various methods of treatment, which we shall have to discuss, because I have always most fully realized the truth and importance of our Editor's recent remark that it is those aviculturists and those alone who take a *theoretical* interest in birds that derive the maximum of enjoyment and the minimum of disappointment from their hobby. With these preliminary remarks I will turn at once to my subject and commence with :—

A list of the Warblers that have occurred in Britain and have been successfully kept in captivity.

N.B.—Some species, such, for instance, as Savi's Warbler,

have been kept in Germany and have even been imported into this country, but are omitted on account of their rarity.

		INS.	
FRUIT-EATERS.	Tails nearly square	<i>Sylvia</i>	Blackcap 5.75 (Mönch-grasmücke) Garden Warbler .. 5.75 (Garten-grasmücke) Orphean Warbler .. 6.0 (Orpheus-grasmücke) Whitethroat 5.5 (Dorn-grasmücke) Barred Warbler .. 6.5 (Sperber-grasmücke) Lesser Whitethroat.. 5.25 (Müller-grasmücke) Dartford Warbler .. 5.1 (Provence-grasmücke)
	Tails slightly rounded	<i>Hypolais</i>	Icterine-Warbler .. 5.2 (Spott-vogel) Melodious Warbler.. 4.9 (Sänger-Laubvogel)
	Tails more rounded	<i>Acrocephalus</i>	Great Reed Warbler 7.8 (Drossel-rohrsänger) Reed Warbler .. 5.25 (Teich-rohrsänger) Marsh Warbler .. 5.25 (Sumpf-rohrsänger) Sedge Warbler .. 5.0 (Schilf-rohrsänger)
	Tail rounded	<i>Locustella</i>	Grasshopper Warbler 5.4 (Heuschrecken-grasmücke)
	Tails forked	<i>Phylloscopus</i>	Chiff-chaff 4.6 (Weiden-Laubvogel) Wood-wren 5.2 (Wald-Laubvogel) Willow-wren 4.9 (Fitis-Laubvogel)
		<i>Regulus</i>	Gold-crest 3.6 (Gelbkopfiges-Goldhähnchen) Fire-crest 3.7 (Feuerkopfiges-Goldhähnchen)
BERRY-EATERS.			

I have attempted to classify the above species in the first place according to their diet (*i.e.* diet additional to insects). Be it noted that the "Fruit-eaters" will also consume berries but the "Berry-eaters" will not, as far as my experience goes, also consume (wall) fruit, though the Cliff-chaff and the Willow-Wren will, in captivity, eat a little banana.

Secondly, I have endeavoured to classify them according to the shape of their tails. There is a lot in tails—almost as much, in fact, as in beaks. The square, or nearly square, tail connotes a species that does not depart much from the ordinary types of Passerine birds; it is not highly specialized; it is generally seen perching in fairly open situations and is not remarkably skilful in capturing insects. The slightly-rounded tail

connotes a species which generally haunts fairly thick covert, into which it slips like magic when disturbed; it is seldom seen at any considerable height above the ground.

The more rounded tail connotes a species which has been to some extent modified by environment; a species which spends a large portion of its life in threading its way through dense reed-beds and sedge tangles. A still more rounded tail is that of the Grasshopper Warbler, a bird which I have watched for hours creeping through the thickest undergrowth like a mouse. We obtain a good idea of this type of tail if we imagine that the undergrowth closing behind the passage of the bird has in the course of long ages gradually worn away the tips of the outer rectrices. (I do not say that the tail has actually been modified in this way, though this is conceivable). This type of tail (though carried to a greater extreme) is exemplified by the Bearded Tit, which passes its life in slipping through the stems of the sedge and which will perform the remarkable feat of flitting through a reed bed without striking the reeds. This introduces us to another use of this type of tail, namely, that of instantly altering the line of flight by powerful leverage. Lastly, we come to the forked tail, which connotes a bird which is constantly making rapid darts into the air in pursuit of insects. Every one must have noticed the little "leaf-inspectors" (*Phylloscopi*), such as the Chiff-chaff and Willow Wren, eking out a scanty subsistence during the cold days of early spring by catching gnats. This type of tail, carried to a further stage of development, is found in the Swallow-like birds.

Now, inasmuch as the more highly specialized species are always least amenable to domestication, we should expect to find that the Square-tailed Warblers will do better in a state of captivity than the round- or forked-tailed species, and it is, I think, some confirmation of the above suggestions, that the order of precedence of the species in the above list might almost be accepted as indicating their degree of suitability for cage-life. There are some exceptions, of course; for instance, the Great Reed Warbler is probably a much hardier bird than the Icterine, or Melodious, Warbler, which is not surprising seeing that it is a much larger bird. An old marshman who, long years ago,

came across a pair in a reed-bed near Hickling in East Anglia, described them to me as being "as big as Mavishes" (thrushes). Mr. Galloway tells me that he considers the Chiff-chaff hardier, easier to "meat-off" and less susceptible to cold than the Reed and Sedge Warblers, and this is to some extent confirmed by the fact that it occasionally winters in our Southern counties: nevertheless, the only Chiff-chaff I ever owned was an exceedingly delicate and chilly little bird, and others have had the same experience.

I think that I have said enough to show that, when one receives a new Warbler, it is well worth while, with a view to estimating its habits and requirements, to have a look at its tail—always supposing that it possesses a tail on arrival, which is by no means always the case.

As some of the above Warblers are not well known in this country I have also classified them by their comparative sizes (length in inches).

Lastly, I have added the names by which these species are known in Germany. The common species can generally be procured in this country, and we are so fortunate as to have in our member Mr. Galloway an expert who can frequently assist us in this matter; but some of the rarer Warblers are not likely to be obtained elsewhere than in Germany. In the German bird-market most of those mentioned in our list can be obtained without any great difficulty in September and May, despite the recent Protection Act.

CAGES.

Speaking generally the Warblers are better housed in aviaries than in cages: they require a large amount of exercise to keep them in health and their tail-feathers are so fragile that they are easily broken. For these reasons, the Thrushes and the Nightingale and short-tailed species, such as the Whinchat, make better cage-birds than the Warblers.

If, however, it is desired to cage them, the cage should be a large one—let us say 3ft. long. It should have a canvas top to prevent injury to the head: if birds are alarmed at night it will be found that they always fly upwards, possibly because the

inherited experience of their race has taught them that their nocturnal enemies are mostly four-footed. In a large cage one usually sees a large number of perches but this appears to me to be quite a wrong principle. We shall only require two perches and these should be set as far apart as possible and should be twigs of varying diameter, thus preventing any tendency to cramp. The object of setting our perches as far apart as possible is to compel our Warblers to *fly* from perch to perch (instead of jumping) thus exercising their wing-muscles. Except in a position where it is impossible to avoid draughts the ends (sides) of the cage should not be of wood. With a cage of this type it is quite easy to make a single bird take regular exercise. All that is necessary is to lightly tap one end of the cage, thus inducing the bird to fly to the opposite perch; then to tap the other end of the cage, thus driving it back to its original position. After a little practice it will be found that the bird can be made to take really hard exercise in this way and this can be continued until it shows signs of distress by opening its beak. Contrary to what might be supposed this system of exercising will not make a bird wild. I once had a Sprosser, which I used to frequently exercise in this way, and yet it became so familiar that I succeeded in training it to sing to command and several of my friends can testify that it would do this even in an out-door aviary and in the presence of strangers.

Wire netting does not look so well for cages as wiring but it is infinitely preferable because in this way only can mice be excluded. I think we can go so far as to say that any cage to which mice have access, no matter what its cost or how artistic its appearance, is a bad cage. The netting I recommend is of three-eighths of an inch mesh and can be obtained at Gamage's to order, but only in lengths of 50 yards.

AVIARIES.

A mere glance at the names of the species in our list will convince us that one type of aviary cannot possibly suit the requirements of all; and, moreover, the same design would not suit all pockets or all tastes, so in the matter of aviaries it will be better merely to suggest what should be avoided and what

should be aimed at in designing a summer aviary for small insectivorous birds.

In the first place, we must have shelter from cold winds, which is best secured by a palisading of tongued and grooved boards, at least seven feet high, extending the entire length of the aviary on the North and East sides. Our aviary, however, must not be built against a wall, or a hedge, or under trees, any one of which conditions will render it absolutely impossible to prevent the ingress of mice, rats and weasels. My original aviaries are in a small walled garden and, I regret to say, I followed the conventional design and built against the walls, the inevitable consequence being that I have been continually pestered with vermin and I look upon these aviaries now as chiefly useful for winter housing. My breeding aviary has now been up almost two years; it has been absolutely free from vermin and has given better results in every way. The space between the palisading and the aviary I use partly for a service passage but chiefly for observation purposes; I have planted it with fruit trees, which bear well, and had a pair of Redstarts in it last year, which flourished exceedingly and almost fed themselves on insects. If an aviary is to be built in a walled garden, there should be a space at least 6ft. wide between its sides and the walls of the garden.

The South and West sides of the above-mentioned aviary are boarded to the height of 3ft.; where the boards enter the ground they are protected by a length of small meshed wire netting 2ft. wide, half of which width is nailed to the skirting and half is buried in a horizontal position under the soil.

The size of netting most suitable for a Warbler's aviary is five-eighths of an inch: if three-quarters of an inch mesh is used, Wrens and Blue-Tits will find their way in and carry off a quantity of live insect food.

The size and shape of a breeding aviary are, I think, immaterial; if it is mouse-proof, sunny, sheltered and not overcrowded one may reasonably hope for good results, but it is really waste of time trying to work with a mouse-ridden aviary because any breeding results will be merely flukes.

We now come to the subject of winter aviaries and we shall have a choice of three courses which we may briefly describe as (1) no heat, (2) heat or (3) some heat. So far as my experience goes all the Warblers, except the hardy little Black-cap, and I may add the majority of the smaller insectivorous species are better for a little heat in the winter. Only the other day I found a very fine Yellow Wagtail in a cold aviary in a badly collapsed condition after a night of hard frost. It was so weak that it was only with the greatest difficulty it could swallow a mealworm and it would undoubtedly not have survived another night in the open. I caught it and placed it in a heated aviary and in two days time it had perfectly recovered.

If we decide to heat our winter aviary we still have to consider whether our Warblers shall be confined solely in the heated portion, or whether they shall be allowed access to the outer flight. Some years since I determined to give the former system a good trial and I accordingly built a small house measuring 12ft. long by 8ft. wide by 7ft. high, the sides being entirely of glass and the roof having two glazed lights, each 30ins. by 24ins. of double glass with an air space between to avoid loss of heat. One side is planted with large clumps of Bamboo and Eucalyptus; on the other side is a large quarantine cage, a small division for invalids and an apparatus for rearing Quails. The foundations are of brick and are mouse-proof and the large ventilating windows (each 4feet long) are screened with mouse-proof netting. The pipe-area is large and the temperature averages 65°. Last winter I quartered all my Warblers here and the result was most promising. Every sunny morning there was a continuous chorus of song, the Lesser Whitethroats contributing the tenor parts, the Greater Whitethroats the baritone and the Garden Warblers, whose song closely resembles the Black-birds', the bass. To enter this little aviary on a bleak, chilly morning was to pass in a single moment from mid-winter to mid-summer. All the Warblers moulted successfully and, when I turned them out in May, they were in the pink of condition. Then came the disappointment! The weather was cold, especially at night. The first day or so all went well. After that there was no more singing and I saw clearly that something was

wrong : they seemed to be getting light-headed, flying aimlessly about and striking the netting or hanging head downwards from the roof of the aviary. I caught up two or three and replaced them in the warm aviary where they recovered, but the rest died. The fact was I had turned them into hot-house flowers and at the first breath of our chilly May weather they simply withered away.

Nevertheless, for wintering delicate foreigners and for singing birds I find this little house invaluable and I think it quite likely that, if these Warblers had been cooled off gradually, they would have turned out much better.

On the whole, I think the best system for small migrants is that which I have described as "some-heat," although this practically means that most of my birds spend much of the day in the heated house and roost at night in a bush in the open. I hang up brushwood close to the roof in the house and let them take their choice. Some roost in and some roost out : probably every bird knows what suits its constitution best. At all events after an extensive trial I find the system answers well.

One word as to management. One constantly sees advice given to beginners to keep insectivorous birds in separate aviaries. I regard this advice as quite mistaken. It seems to me that the more soft-bills are mixed up with hard-bills and distributed amongst the different aviaries the better : by this method we get less fighting and whatever food supplies the aviaries afford in the form of live insects are fully taken advantage of.

FEEDING.

There is probably no subject on which aviculturists differ more than that of the feeding of insectivorous birds. This alone shows that we have not yet devised a good system of feeding, because, if there were such a system, everyone would adopt it. As a matter of fact I do not believe that more can be done with insectivorous birds to-day than was done a couple of centuries ago. In the first avicultural article I ever wrote (I think it appeared in the *Zoologist* in 1887) I showed that the Swallow was successfully kept in a cage through a whole winter more

than one hundred years ago, and I gave instances of the successful domestication of the Martin and Swift. Yet when, years later, a Swallow appeared on the show-bench, everyone thought it a marvel! Until some genius introduces us to a wholesome, nutritious insect, which can be propagated cheaply and in quantities at any time of the year, the feeding of Warblers must remain as it is at present, a compromise between a natural and an artificial diet.

Nevertheless, the system which I shall venture to put before you is an attempt to render the feeding of insectivorous birds more simple, more economical and more natural. I aim at feeding the Warblers entirely on live insect food but, inasmuch as this is not always practicable, it is absolutely necessary to have some kind of stock-food as a stand by. The very best I know of is Mr. Galloway's "Life" food, which, I believe, is chiefly composed of dried flies and ant-cocoons and "gram" (known in India as *sattoo* or *sattu*). I use a good deal of "Life" and I should use more if I were wealthier, but a family of some forty Softbills is not fed for nothing. I, therefore, substitute for general use ordinary sponge-cakes, as sold at twenty-five a shilling. They are fairly nutritious, require no preparation, and cannot by any possibility become stale or sour. I do not crumble or damp them. There is alleged to be some egg in sponge-cakes, with regard to which I can only say "*credat Judæus Apella*," but at all events I do not use egg in any other form. Freshly-boiled yolk of egg is, however, undoubtedly nutritious and we must also accept the fact, strange as it may appear, that some aviculturists can use even stale egg with success. For instance, our member Mr. Tinniswood Miller recently recommended (in *Bird Notes*) a soft-food mixture which included "the yokes of two hard-boiled eggs rubbed in, . . . made up fresh *every week*" (my italics), and Mr. Miller, as we all know, is most successful with his birds.

The only practicable and inexpensive form of live insect food which I at present know of is gentles. These are somewhat indigestible and most unpalatable; hence our Warblers will not eat many at a time, and we can, therefore, afford to keep some always before them. Instead of gorging on live-food my Warblers take a few from time to time as they feel inclined,

which is, of course, exactly what they would do in a state of nature. I will ask you to carefully compare this system with the conventional one of making the bulk of the food supplied artificial and giving a little live insect food as a luxury.

In the matter of obtaining gentles in the winter I think the best course will be to give you the address of Mr. F. Fishburn, Silsden, Keighley, who can supply at reasonable rates throughout the year. I produce my own gentles in an Incubator which, however, is exceedingly imperfect (being probably the first of its kind) and is so difficult to manage that I cannot recommend it.

The above system of feeding will be found adequate for all the Warblers in our list, except the little "Fork-tails," and for these I have found Mr. Galloway's system ("Life," crumbled York cheese and chopped mealworms) fairly successful. It is important to remember that all insectivorous birds should be fed on as dry food as practicable, one advantage of which is that the crop, which has a tendency to become slimy, is kept in good order. I have known a Blackcap fed successfully on a perfectly dry mixture of Quaker Oats and small seeds, and this is the more remarkable because there is some evidence that insectivorous birds cannot digest seeds unless crushed. I have, however, seen a Black Redstart eating Canary seed, and on several occasions have noticed insectivorous birds feeding their young on small seeds, so the latter may perform some useful function even if not fully digested.

P.S.—I have omitted to say that ripe fruit should always form part of the diet.

WHITE-CROWNED PIGEON
(*Columba leucocephala*).

Photos by D. Seth-Smith.

PARTRIDGE BRONZE-WING PIGEON (*Geophaps scripta*).

III.

FOREIGN DOVES.

By Miss ROSIE ALDERSON.

The keeping of foreign doves and pigeons has never been a very popular branch of aviculture, though many more people keep them than in former years; and yet they are birds that have many advantages, being long-lived, hardy (with a few exceptions) and very adaptable to confinement. In many cases they will rear young whilst in captivity, and a *nesting* bird is, to my thinking, a *contented* bird; it shows that the old life of liberty is to some extent only a memory and not a regret.

Though I have kept, and still have, many other kinds of birds, yet I have gone in chiefly for keeping doves, and, at one time and another, have had more than 40 varieties.

The Fruit Pigeons are so seldom to be had, and so rarely kept, that there seems little to say about them. They vary very much in size, and are often most beautiful in their colouring, many of them being green, with perhaps a touch of purple or yellow. They need boiled maize as their staple food, prepared freshly every day, for it soon turns sour, and this is rather a drawback to keeping them, as any bird-food that has to be *cooked* is a certain amount of trouble.

In giving a list of such doves and pigeons in each family that are *generally* kept, I have thought it well to add some very brief notes on the colouring of the plumage for the purpose of

identification. Setting, therefore, the Fruit Pigeons aside, as birds almost unknown in English aviaries, a fact much to be deplored, we come to the

TYPICAL PIGEONS (*Columbidæ*.)

THE TRIANGULAR SPOTTED PIGEON (*Columba guinea*).

A large bird, slate grey in colour, with a reddish neck of bifid feathers, the wings are dotted with triangular white spots. This pigeon's coo is a strange kind of barking noise, sounding almost unnatural in a bird. The eye is red, surrounded with bare red skin.

THE SPOT-WINGED (OR SPOTTED) PIGEON (*Columba maculosa*).

A large, but beautifully-shaped bird; the general colour being pearl and ashy grey, the wings covered with whitish spots. The eye is also grey, and the "bloom" on the neck and shoulders of a well-conditioned bird is very lovely. I look on this pigeon as almost the most beautiful of any of the larger varieties I have known.

THE WHITE CROWNED PIGEON (*Columba leucocephala*).

A handsome dark slate bird, with a whitish cap on the head and a sheen of colour, like the scales of a mackerel, on the neck.

All the above birds are too large to keep in a small aviary with other occupants, though they might do well if given an aviary entirely to one pair of birds. I have found all these pigeons hardy and all good-tempered to others of their own kind.

We now come to the Turtle Doves and their allies (*Peristeridæ*), beginning with the sub-family *Zenaidinæ*.

MARTINICAN OR AURITA DOVE. (*Zenaida aurita*).

A plump, well-shaped dove; the general colour being rich chestnut fading into purplish-pink on the breast. There are a few black and white spots on the wings, and the neck has very beautiful purple and gold reflections. The eye is full and dark. The Aurita is a very handsome dove and easy to breed, but its great drawback is its aggressive ways to others of its kind, and being a very bold bird it soon becomes master of the situation. It is very common in Jamaica.

THE WHITE-WINGED ZENAIDA DOVE (*Melopelia leucoptera*).

This bird is about the same size as the Aurita, but rathe

more slender, and it has somewhat the same tyrannical disposition. Its colour is a soft drab, with a broad white band running down the wing. The eye is bright orange surrounded by a beautiful patch of bare sky-blue skin. The neck is metallic with purple and brass sheen.

We now come to the sub-family of the Turtle (*Turturinae*), beginning with the familiar

BARBARY TURTLE DOVE (*Turtur risorius*).

This dove is too well-known to need much description, and yet in spite of its being so common—a pair can be bought for two shillings—it is always beautiful in its coat of cream with black collar and bright red eyes. These birds have become so domesticated, like the Canary, that no one would think of them at the present day in the light of an imported foreign bird. They breed almost too easily in captivity, using any site or material; they are very long-lived, and can be very readily tamed. I have kept some for years as foster parents for hatching rarer doves eggs, but I never found them a great success in this way; they seem to find out they are being imposed upon and their interest in the strange young when hatched is generally short-lived. A pure white variety is known as the Java Dove.

THE MADAGASCAR TURTLE DOVE (*Turtur picturatus*).

This is a rare dove, and has not so far been kept by many aviculturists. It is grey on the head and face with a checked hinder neck, while its body is maroon and brown. In shape it is strong and sturdy, though not a large bird.

HALF-COLLARED TURTLE DOVE (*Turtur semitorquatus*).

A fine large bird, vinous colour (in varying shades) all over. The top of the head and forehead whitish grey. It has a black hind collar with a narrow grey edge; the eyes are red.

DAMARA TURTLE DOVE (*Turtur damarensis*).

Very like the Barbary Turtle, but much greyer and smaller and with dark eyes instead of red. It is a common bird in its own land, but seldom imported to this country.

THE DWARF OR RUDDY TURTLE DOVE (*Turtur humilis*).

A beautiful little dove, very small compared to any previously described, trim and graceful in shape. The sexes are

very distinct in colour, the cock being of a ruddy colour with black wing quills and a clear ash-grey head and broad hind black collar, while the hen is dun grey except for a collar of black. The eyes of both are very dark and full. The young cocks resemble the female till they are quite a large size when the ruddy feathers will be seen coming gradually. The Ruddy Turtle nests readily, but the young are often forsaken just before they can do for themselves.

THE NECKLACED DOVE (*Turtur tigrinus*).

A very lovely dove, slender in build and with a long tail. The general colour is brown, with light buffish spots on the wings. The breast is vinous, the head pinkish grey, and the eyes reddish orange. A very broad black and white checked collar round the back of the neck. This dove seems very seldom imported now, though, at one time, some years ago, it was very easy to procure it. It nests freely, and is one of the most beautiful of the dove family. The Necklace comes from Burma, but a very similar dove known as the Spotted Turtle Dove (*Turtur suratensis*) comes from India, and is really the handsomer of the two, for the eye is larger and a rich ruby-red, and the wing spots are much brighter and more distinct. My cock Spotted Turtle and my hen Necklace brought up many young ones; one year I reared seven birds.

THE SENEGAL TURTLE DOVE (*Turtur senegalensis*).

This is a very favourite little dove; in colour reddish and grey. It has a black-checked collar running round the *front* and sides of the neck, differing in this respect from most doves, for the collar is usually behind. The Senegal Dove readily breeds in captivity and is a very pretty and bright little bird, though, to my thinking, not so attractive in colouring as the Ruddy Turtle.

We now come to the aberrant TURTLE DOVES (sub-family *Geopeliinæ*).

THE BAR-SHOULDERED DOVE (*Geopelia humeralis*).

This is one of the handsomest and, at the same time, one of the most quarrelsome of all the members of the dove family. It is not a very large bird, but is long and slender in shape, with rather a small head in proportion to its size. The colouring is chiefly grey and brown with bars of black across the wings, and

a fine deep hind collar of cinnamon and black. The breast is a delicate pinkish shade, the head grey and the eye yellow, while the bare skin round is blue-grey. The two hens I have had were both smaller and duller and not so striking-looking as the cock bird.

THE PEACEFUL DOVE (*Geopelia tranquilla*).

This is another barred dove, but much smaller in size than the Bar-shouldered; its length being only about nine inches. The general colour is grey crossed with narrow black lines, the iris is bright ash-grey.

THE ZEBRA DOVE (*Geopelia striata*).

There is little difference between this dove and the Peaceful Dove, but in the latter the black bars *entirely* cross the breast, which is not so in the Zebra, also the last-named has a brown iris. It is much the more amiable bird of the two.

THE DIAMOND DOVE (*Geopelia cuneata*).

This tiny little dove is deservedly a favourite. It is very small, slender in shape and with a long graceful tail. It varies in colour, some specimens being drab, and others a clear ash-grey. The wings are dotted over with tiny white spots as if the bird had been out in a snowstorm. The colour of the eye and surrounding skin also differs; in some birds being bright ruby red, in others, greenish-yellow.

THE SCALY DOVE (*Scardafella squamosa*).

This is another small slender dove; in colour pale brownish with darker barring of brown. It is not often imported and specimens vary very much, some seeming almost black and others quite light brown, the bars in the latter case showing, of course, most conspicuously.

We now come to what Dr. Butler terms the METAL-SPOTTED DOVES (sub-family *Peristerinæ*). The first is:—

THE PICUI OR STEEL-BARRED DOVE (*Columbula picui*).

This is a very tiny little dove. I have kept many specimens and found it vary very much in colour, from grey to almost black. The hens are much browner than the cocks; the most usual colour for the latter being a soft grey. High up in the shoulder is a bar of steel-blue feathers right across the wing. The eyes are very lovely, the iris purple surrounded with a pale straw-coloured outer ring.

THE PASSERINE DOVE (*Chamæpelis passerina*).

This is an even smaller dove than the Picui, and is found in many parts of the world. It varies very much in the ground-colour of the bird; some are almost vinous, others brown, and again I have had one bird almost black. In all, however, the ground-colour is dotted with a darker shade, giving the bird an almost scaled appearance. There are steel-blue dots on the wings, the eyes are purple, the beak orange (or in some birds yellow) with a dark-brown tip. The Passerine is very much of a ground dove and can run at a great pace.

THE CINNAMON OR TALPACOTI DOVE (*Chamæpelis talpacoti*).

A small reddish-brown dove with steel-blue marks on the wings and a grey head. It is rather larger in size than the Passerine.

The next in order are the BRONZE-WINGED PIGEONS (sub-family *Phabineæ*).

THE HARLEQUIN OR CAPE DOVE (*Ena capensis*).

This pretty little dove is sometimes called the Masked Dove. In shape it is long and slender, greyish and black in colour with a black mask (in the cock bird) over the face and throat. The bird's flight is very weak and hovering, and with its long tail-feathers it looks like some large swallow-tailed butterfly poised in the air, but it is seldom this dove flies about, for most of the day it sits quite still on its perch unless disturbed.

THE TAMBOURINE DOVE (*Tympanistria tympanistria*).

This dove is also small, but totally different in shape to the Harlequin, being round and chubby. It is a most beautiful little bird, rich chocolate brown in colour with dark metallic spots on the wings, the forehead, cheeks and breast being pure white, the contrast between this and the dark-brown is very marked. The hen has no metallic spots, and is lighter-brown in colour, and greyish where the cock is pure white.

THE AUSTRALIAN GREEN-WINGED DOVE (*Chalcophaps chrysochlora*).

This is a very handsome bird and is always admired in an aviary. The cock is rich maroon with bright "bottle green" wings and back. The shoulder butts are pure white, the beak

bright red. The hen is browner in tint, and has no white, or only very little, on the shoulder.

THE INDIAN GREEN-WINGED DOVE (*Chalcophaps indica*).

This dove is very similar to the one previously described, but, to my mind, it is the handsomer of the two, as it has a white forehead (shading into lead colour on the crown) and a white eyebrow streak which gives it a very distinctive appearance. In the hen the forehead is greyer.

THE BRONZE-WING PIGEON (*Phaps chalcoptera*).

A fine large bird, but with rather short legs in proportion to its size. It is mottled like a pheasant and, as its name implies, has beautiful metallic reflections in the wings. In my cock these reflections are emerald and fire-red, in the hen sage-green and gold, but individual specimens vary. The forehead in the cock is buff, in the hen white. The Bronze-wing nests readily, but it is too large a bird for a very small aviary.

THE BRUSH BRONZE-WING PIGEON (*Phaps elegans*).

A much smaller bird than the former and much more rounded in shape, but equally beautiful. The colouring is not mottled but rich maroon brown and grey, with bright metallic feathers in the wing. The hen is duller in colour, and has not so buff a forehead as the cock.

THE PARTRIDGE BRONZE-WING PIGEON.

(*Geophaps scripta*).

This is a very pretty little dove. In shape it is rather like the ordinary Bronze-wing, and mottled with brown and white in something the same way. It has very decided white-face markings, and the reflection in the wing is green. The nest is made in a hollow in the earth, two eggs being laid therein. It is a bird that seldom flies about, but spends most of its time on the ground. It is very quiet and never interferes with any other inmate of the aviary.

THE PLUMED GROUND DOVE (*Lophophaps plumifera*).

This is a very tiny little dove, with a long upright crest on the head. It is very active and, like the Partridge Bronze-wing, nests on the ground, and can run at a great rate. The general colour is bright cinnamon, with darker markings, and black and white face colouring, a grey and black band cross the breast. A touch of brightness is given by the bare red skin

round the eye. A very similar dove in shape and colour is the White-bellied Ground Dove (*Lophophaps leucogaster*), the chief difference being that it has a white band—as well as the black and grey one—across the breast

THE AUSTRALIAN CRESTED PIGEON (*Ocyphaps lophotes*).

A very handsome bird, but rather a tyrant in the aviary. It is a fair size and well proportioned. In colour it is chiefly grey, barred over with black, with purple, green and white metallic feathers in the wings. The breast is pinkish-grey, and a black upright crest surmounts the head. The Crested Dove is very hardy and breeds well in captivity. Some birds are darker than others and, as a rule, the darker the bird the richer the metallic colours, but I look on the light birds as being far the prettier of the two shades.

We now come to the GROUND DOVES and PIGEONS (sub-family *Geotrygoninæ*).

THE RUFOUS DOVE (*Leptoptila reichenbachii*).

The upper parts of this dove are olive brown, the breast soft rufous, while the forehead is whitish, shading into grey on the top of the head. There is a purple sheen on the neck and shoulders. In shape it is stoutly built, with rather long legs. The Rufous is a very good-tempered dove and nests readily in captivity.

THE WHITE-FRONTED or VIOLET DOVE.

(*Leptoptila jamaicensis*).

This is one of the most beautiful of all the dove family. It is about the same size as the Rufous Dove; the back is olive brown, the neck very metallic in lights of gold, green and purple, the forehead white, shading into grey on the top of the head; the face, throat and breast pure white, with a patch of purple pink on each side of the upper breast, the shoulder butts white. This dove does well in captivity, but it is not often that young ones are reared. It seems to feel the cold, but not to such an extent but that it can winter out of doors if protection is given.

THE RED GROUND or RED MOUNTAIN DOVE.

(*Geotrygon montana*).

This dove is getting increasingly rare. It is small in size and the sexes differ in colour, the cock being rufous red shading to buff on the under parts, whilst in the hen the red is replaced

by olive brown. It is a timid bird and seems to have no idea of standing up for its own rights. A hen I had was fond of fruit, grapes and tomato, as well as seed.

BLEEDING HEART PIGEON (*Phlogœnas luzonica*).

This is a very striking looking bird. It is a fair size, sturdy in shape, with long legs. The upper parts are a beautiful blue-grey, with darker bars alternating with lighter ones across the wings, making four bars in all. The forehead, throat, and breast are pure white, and in the centre of the latter part is an irregular shaped patch of blood-red feathers. The back of the neck and shoulders has a lovely sheen of dark opal green, the eye is soft purple. This pigeon is fairly easy to keep, but I find it needs warmth and a dry floor in winter, as it spends much of its time on the ground, and if exposed to a wet and cold surface its feet may become diseased. It will often nest, but it is very seldom the eggs are hatched or any young reared.

THE WONGA-WONGA PIGEON (*Leucosarcia picata*).

A very large bird, slate-grey, black and white in colour. It is very handsome, with lead-grey breast patches and white chest, covered at the side of the body with triangular white spots. It is too large and heavy a bird to keep in a small aviary, though those I had were of a peaceful disposition.

THE NICOBAR PIGEON (*Calœnas nicobarica*).

This strangely-shaped bird belongs to the family of Hackled Pigeons (sub-family *Calœnadinæ*). It is a large heavy bird, its prevailing colour metallic green and bronze. The neck feathers are hackled, giving the bird a most curious look, almost as if it had got wet through and had never properly dried. I have not kept the Nicobar myself, though I have seen it in other aviaries; the bird's colouring is beautiful, but its shape very clumsy and unattractive.

* * *

FEEDING.

I give my large doves a staple diet of wheat, dari, hemp, white millet, and a little rice. They have also a good supply of pea nuts (or monkey nuts) shelled and cut into pieces, and I look on this last item as being very important in keeping the birds in good condition and glossy plumage, the oil in the nut contribut-

ing to this end. I know of only one firm that supplies the nut in this form (and also a "soft food," price 8d. per lb., that I shall mention later on), namely, Messrs. Armitage, Seed Merchants, Castle Gate, Nottingham, and the price is about 4/- per stone, the size of the piece of nut can be regulated as desired.

Doves are also fond of ground sweet biscuit, this I cut up myself in a Spratt's cutter, but I look on the biscuit more as a luxury than a necessity; still a change and variation of diet is good for all birds, and helps to keep them happy and healthy.

Some doves are fond of fruit as well as seed. My Black-bearded Doves like red currants, the Bronzewings wineberries (not quite ripe), the Bleeding Hearts grape stones, and I have already told you how the Red Mountain Dove liked cut up grapes and tomato.

I also find that "soft food" is much appreciated by some birds. My Bleeding Hearts, for instance, have it daily, and it keeps them in perfect condition. I have no doubt many of the others would enjoy it too, but to give it to *all* my doves regularly would mean a large addition to the cost of my food bill. I have used this particular "soft food" for years, it is mixed with an equal quantity of dry ground biscuit and moistened; the birds all seem to do well on it (if given in addition to the seed diet) including my cock Barraband Parrakeet and many other birds besides the doves. Of course, the very tiny doves must have small seeds given besides those larger seeds already mentioned.

Another thing to remember is to have a good supply of ground egg-shell, the shells being well dried over the kitchen range before they are crushed. Especially put plenty of grit on the floor during the nesting season, and you should have no soft-shelled eggs.

When nesting, give the old birds plenty of food, especially of any seed they seem to like. Remember they have not only to feed their young ones from the crop, but to keep up their own strength under the strain of nesting. A young bird well fed will stay contentedly in the nest, and between eating and sleeping should grow well; but if not sufficiently nourished it will be restless and probably wriggle out of the nest in its helpless efforts to satisfy its needs.

HOUSING.

Most doves are hardy and can stand our winters if some protection in the shape of cover is given. Of course the severity of the winter varies in different parts of the country. Here in Nottinghamshire we get our share of cold (up to 28 degrees of frost sometimes) though not very far north.

As a rule, doves do not seem to care much for heat, and in my largest aviary they prefer roosting under the glass roofed part of the flights to going in the shelters, where they would get some heat from the stove in the passage that runs along the back of the aviary. As it is, this fire is of little or no benefit to them, but it is a necessity on other accounts, namely, keeping the stored food-stuffs from damp, and giving heat to some parrots and squirrels who live in cages in the passage, also it is very useful to have heat in case of sickness.

If you have room, therefore, give your birds as long a flight as possible, with plenty of cover *under a sheltered roof*, for I do not think it advisable to encourage the birds to roost in cover that has only wire netting above it, for it must mean that on a wet night the birds are often sleeping wet through. I put plenty of bare perches in my open part, but, though the birds use them in the daytime, at night they nearly all go into the cover under the glass roofed part of the flight, and looking in from the front of the aviary you would almost think it empty.

The best cover to use is *Scotch* Fir branches fastened with nails and wire to the aviary walls. It makes the aviary look very pretty, and can easily be renewed when necessary; further, the branches being off the floor it gives more ground room, and the mice cannot so easily climb up it. I find the *Scotch* is the only fir that keeps its "needles" well; if this cannot be had pea-sticks can be used, laid crossways, but nothing is so nice as the fir.

My doves much enjoy a broad wooden shelf running along the front of the inside of the aviary, about half-way up from the ground. They spend most of the day on it, basking in the sun in summer, or enjoying, with uplifted wings, a shower of rain. A good wetting like this does them good in the daytime, and is quite a different thing to birds roosting wet through.

A bath is a necessity, for doves are very fond of bathing.

It should be large and shallow, with a waste pipe let into the ground. I use earthenware cottage sinks, and make a flight of two or three steps down into the bath by cementing in some flat tiles.

Half my flight, that portion under the glass roof, is floored with cement; the other half, directly under the wire netting, is of crushed ashes over earth, with wire sunk underneath.

It is a good plan to have a draw curtain, with rings on a wire, across the front of the aviary. It keeps out the cold at night and prevents cats frightening the birds. In the daytime it can be tied back, but in very bad days in winter I keep it drawn. In cold weather I also have a piece of canvas stretched and nailed down over the wire top, and in summer this is shifted up to the glass-roofed part to act as a shade, for the glass gets very hot and trying to any nesting-bird sitting underneath it. Of course, in a very large wire-roofed flight it would be next to impossible to cover it with canvas, but my flights are, unfortunately, only small.

I have to bring in a few of the doves in winter into a closed-heated aviary, even with the protections from cold I have described. The Bleeding Heart Pigeons have always to come in, and, as a rule, you will find any of the tiny doves, such as Cape, Passerine and Picui cannot stand the severe weather, they seem to have far less stamina than the larger varieties. A cold bird often ends in being a sick bird, and though I strongly advocate fresh air, yet I think it cruel to force a bird to winter out when its constitution cannot bear the strain.

* * *

NESTING.

Doves readily make nests and lay, but not so easily rear their young. A good pair of parent birds, that are sober enough not to start a second nest until the first is finished, are invaluable. The aviary should be prepared for nesting by the middle of February, all cleaning done, any fresh branches put up, and the zinc nest pans tied in their places. These pans I have made at our ironmongers, they cost 6d. to 9d. each, and are shaped something like a flower-pot saucer, but with a rounded bottom and a more slanting edge. They can be made any size, will wash, and are never worn out. Holes are punched at intervals round the

edge, through which to pass the string to tie them to the branches. You need two nests to each pair of birds, as if you put up one only the young ones may be turned out before the proper time if the old birds desire to nest again. It may be urged the second nest only tempts them to start afresh, but I look on it as the lesser evil.

Plenty of dried heather should be scattered on the floor. If you have none growing near you it can be bought by the bundle from Mr. Fred Hiscock, Blashford, Hants. I get some from him every year and know of no better or more cleanly nesting material, and it may even be soaked and washed and used a second time. I also put a small handful in each nest to start the birds. The heather should be broken into lengths about five inches long, and after the birds have picked up what they want from the floor, and the eggs are laid, the remaining heather should be taken away or they may still go on piling it on the top of the eggs.

Sometimes the birds will not care for your site of a nest, but will choose their own, *squatting*—not perching—in the particular branch. When you notice this it is as well to put a nest pan up in the exact spot, when the birds will probably start at once; doves are very peculiar in their little ways and cannot be forced.

I make it a rule always to fasten up my nest pans in the cover under the glass roof or shelter—not in the open flight, for it is most essential that whilst the young are in the nest, and especially when too large to be brooded continually—they are kept *dry*. Be sure and put a thick bed of hay or straw under the nest when the young are hatched, so as to make their first descent easier or to soften their fall should they tumble out prematurely. Sometimes you may find a partly-fledged dove on the floor, with no broken limbs,—the hay has saved *that*—but in a state of collapse and cold and limp, its legs stretched, and head dangling down, perishing for want of its parents' warmth. It is always worth while to hold the helpless little thing in your hand for say half-an-hour or more. If there is just a spark of life left the live warmth of your hand will bring it round more quickly than anything. It is wonderful how far gone a bird may be and yet

recover. Do not hurry its recovery, let it at least be able to hold its head up and to sit upright in your hand before you put it back in the nest, and be sure and do this very gently, or the second young one may jump out too, and do not attempt it while the old bird is in the nest. Of course, you may just send it off, but there is a great risk it might not come back, and in that case you would probably lose both young ones.

It is useless, however, to attempt to restore a young bird to the nest when it has got beyond the fledgling stage, and is getting fully feathered, for it would only jump out again. If a young bird should leave the nest just a day or two before it naturally should do, it is better to leave it and not interfere.

When the young ones are out, take away all your hay bed, save a small handful in one corner for the young birds to nestle in, (for a soft floor quickly makes weak legs), they should be prevented from wandering into any part of the aviary where the top is open netting or the floor damp. If you do not do this they will be certain to squat where they should not, for their little legs are soon tired, and the result will be an internal chill caused by contact with the cold surface. The next stage will be that the young one will become greatly relaxed, and will weaken and die, for the parents will purposely neglect an unhealthy young bird. It is not a bad plan to put lidless boxes (turned on one side) with a snug bed of hay in, for the young ones to go into at night, as they will probably not return to the nest after once leaving it, indeed, as they are not yet at the flying stage it would be an impossibility when once they are on the floor.

On the question of hand-rearing a deserted young bird, I think there is much to learn, and all being well this summer I hope to make some experiments. I used to think it a hopeless task, but recently I have rather changed my mind from an accidental discovery.

The most important point is to know *when* to take the bird in hand. If the weakness has got ahead there is a poor chance of overtaking it, and whilst ever there seems a chance that the parents are doing their duty one is reluctant to interfere.

Quite accidentally last year I learnt *how* to feed a young dove. Doves, as you know, feed the young from the crop, the

young ones putting their beaks right inside that of the old bird who pumps up the food from its crop. I never liked the idea of feeding young birds from one's lips, so I used to try and hand-feed with a blunted and shaped quill toothpick, opening the beak and forcing the food down the throat. Often it was a failure. Young doves are very obstinate and *will* die, if they want to, despite all you can do. Last summer, I was hand-rearing a little Barbary only a day or two old. *Its* rightful place had been taken by a small Brush Bronzewing, who, being smaller than its foster-brother, was getting too little food and doing badly, so I took the Barbary's own young one away. It did wonderfully well, and being very healthy wriggled about in my left hand as I fed it with the toothpick, making it rather a work of patience, for it lost as much food as it took. Suddenly it accidentally pushed its head between the base of the first and second finger of my left hand, and the change in its attitude was instantaneous. *It thought my fingers round it was the enclosing parent's beak*, and its mouth opened very wide and it took the food almost faster than I could put it in. After that things went gaily, I had no more trouble of forcing an obstinate little beak open with the toothpick, but had only to put its beak between my fingers when it would wriggle and squeak for food, opening the beak *very* wide and standing on tip toe in its excitement.

During the intervals of feeding, the little dove was kept in a pot placed on the hot pipes in the greenhouse. A handful of hay was put in the pot, some flannel on the top of the bird, and over this a piece of perforated zinc to prevent the young one jumping out. It soon knew my step and voice, and would at once start squeaking, even if it could not see me, when I came to feed it.

The young Brush Bronzewing dying I put the Barbary back with its parents; they seemed very pleased, and at once went to feed it. And now comes the strange part, instead of thrusting its beak into that of the old bird, the young one just *opened its beak and squeaked*. The cock Barbary retired quite puzzled, and evidently consulted with the hen, for in some way she made the young one understand, and shortly after I saw it being fed in the natural way. It may have been partly the heat

but this young bird grew and throve most wonderfully under my care, which was almost from the time of hatching. It was a well-feathered bird when I put it back in the nest. As food for hand-rearing a young bird I should give the following articles, all moistened and made soft with water : Spratts' malt milk and pepsinated puppy meal for the first day or two (both these articles are in powder form, like flour, and can be mixed to any consistency), then "soft food" in addition, mixed with biscuit, and, later still, soaked small seeds.

Doves have the reputation of being quarrelsome and, in some individual cases it is true, but this is the case with *all* kinds of birds, their tempers vary just as much as human beings do. I think the great secret in doves living happily together (where more than one pair is kept) is to find out which birds will agree, and having once found a peaceable combination, not to disturb it. Some time ago I had four pairs of different doves all nesting in one small aviary ; further, they carried their amiability so far as to feed each others young ones. On the other hand, if there is going to be trouble it will show itself at once, and it is better to separate the birds straight away, for nothing will induce them to be friendly if they have made up their minds to be the reverse.

I look on doves and pigeons as very pleasant birds to keep, and their harmonious colouring grows on one very much. Their different notes, too, are very interesting, for many birds have varied coos to express their moods.

I have no space to touch on sickness, but with any sick bird I think *heat* is most important, for an ailing bird so quickly grows cold, and for this purpose a stove in the aviary is invaluable. In summer, a *flat* hot-water bottle in a box with a bed of hay might be used, or I have sometimes thought a chicken "foster-mother" would make a good "hospital cage."

This is only a bare outline as to the keeping of doves ; they are a family of birds long neglected, and there is still very much to learn about them. There are hundred of kinds never yet imported, for the dealers get very little encouragement, but to anyone with enterprise and ample means at their disposal there is a grand opening to bring some entirely new knowledge to aviculture, of a very pleasant kind.

H. Goodchild del.

BLUE-RUMPED PARRAKEETS (*Psittinus incertus*).

IV.

PARRAKEETS,

By D. SETH-SMITH, F.Z.S.

PART I.

The keeping and breeding in captivity of Parrakeets has for long been a favourite hobby, for, taken as a whole these birds are hardy, easy to keep and very showy.

In a popular article it is not possible to go very fully into the habits and requirements of the various and very numerous species of the smaller Parrots which are known as Parrakeets or Paroquets, so I propose to divide this paper into two parts, the first dealing with the kind of aviaries most suitable for these birds, and the second with the birds themselves.

AVIARIES FOR PARRAKEETS.

The best type of aviary, in the opinion of the present writer, is that consisting of a well lighted covered shed or house, opening into a large wire flight containing a drinking fountain or large bath and a turf lawn. If many species of Parrakeets are to be kept, a range of such aviaries should be erected with a southern aspect, compartments being divided off for each pair of the larger kinds.

Regarding the size of such aviaries. This of course must be governed by the available space, but, as a general rule, the covered portion should not be less than eight feet square and ten feet high. If larger than this, so much the better.

The wire flight should, if possible, cover a larger area than the shed. A good rule being to make the area of the former double that of the latter.

It is advisable that the flight should be less in height than the shed, and the top of the opening from one to the other should be as high up, or nearly so, as the top of the flight, most birds, especially when new arrivals, objecting to dipping down into a low opening.

The covered portion of an aviary should be substantially built, preferably of brick, or double tongued boarding, and care must be taken that no holes or chinks are left that would cause a draught.

The roof should consist of tongued boarding, felt, and tiles or corrugated iron, and should contain a large skylight made to open for ventilation in hot weather, a wire-netting guard being fixed on the inside.

A door or large window should be fixed to the opening into the flight, so that the birds can be shut in altogether if necessary. All windows should have a wire-netting guard on the inside.

The floor of the shed should be of concrete, that of the flight mostly of turf with a gravel path.

Such is, in outline, the plan of a very simple and useful type of aviary, but this can be improved upon considerably if thought desirable. For instance, in a range of such aviaries a service passage running along the back with doors into each compartment is most useful as it allows the attendant to visit any one compartment without the necessity of going through several other compartments to get to it.

It is most important that the aviary be made secure against the ingress of such vermin as rats, stoats or weasels. The inside or shed portion, if provided with a concrete floor will be practically safe, but the outer flight, which has a natural floor of earth is the most likely place for the enemy to attack. A simple and effective method of making this secure is as follows. A trench should be dug round the flight, eighteen inches wide and eighteen inches deep, and the wire netting, which by the way should be of five-eighth or even half-inch mesh, should be carried

to the bottom of the trench and then turned outwards at right angles to the width of the trench, and the soil filled in and rammed. With this protection, providing there are no old drains below the site, the aviary may be regarded as safe.

WARMING.

If only the hardy species of Parrakeets are to be kept, and these introduced during warm weather, it will be unnecessary to provide artificial warmth during the winter months, providing the aviary is in a sheltered position and has been properly constructed. As a rule, however, the amateur is not content to keep only the hardy kinds, but wishes to keep those from such habitats as the Northern parts of Australia or Tropical America, and this being so it is necessary to provide artificial warmth during the English winter. For newly-imported birds also, some slight warmth is necessary until they become acclimatised, even though they belong to species which are quite indifferent to cold when once established. It is, therefore, desirable that an efficient warming plant be included in the specification of an aviary for Parrakeets.

If the aviary is divided into several compartments it would be a good plan to be able to warm say half, that is, there would be three of the inner portions warmed in an aviary of six compartments.

Regarding the type of apparatus most suitable. Hot-water pipes, heated by a coke or anthracite boiler provide the most economical and safest means of warming. A row of two four-inch pipes, one the flow and the other the return pipe, should be found quite sufficient. The boiler should be outside the aviary, in a small shed at one end, where it can be stoked at night without disturbing the inmates of the aviary. If possible the pipes should run along the front of the building, just below the doors into the flight, or the flow pipe may be carried above the doorways and the return below them. The pipes should be protected by a removable wire-netting guard.

There are many good boilers on the market. The present writer used a "Horseshoe" boiler, which was quite successful, but there are others equally good. One word of advice regarding the boiler may be added, namely, that it is false economy to have a very small boiler, as in order to properly warm the

pipes it is necessary to drive a small boiler so fiercely that it requires constant stoking, and thus burns much more fuel than a larger boiler which is allowed to burn gently.

AVIARY FITTINGS.

A tray, about two inches in depth and from nine to twelve inches in diameter forms a very useful receptacle for seed. It should be supported upon a light iron framework hung from the roof, where mice cannot reach it, and in such a way that it can be lifted out for cleaning daily.

Nesting boxes are made in varying shapes and sizes. They should be oblong in shape, with an entrance hole at one end near the top, a short perch just below this hole, and a small door near the end farthest from the entrance, for inspection and cleaning. The bottom of the box should be so formed that there is a saucer-shaped depression near the end, and a gentle slope down to this from the entrance.

For such Parrakeets as Cockatiels, Roseellas, Redrumps, and so forth, the dimensions of the box would be: length, 1 foot 6 inches; height and width 8 inches; and the entrance $2\frac{1}{2}$ inches in diameter. For larger birds, such as Kings, it should be somewhat larger, and rather smaller for such as the smaller Coures and Lorikeets.

For Budgerigars I have found the most suitable box is one eight inches in height by six inches in the other two dimensions, with an entrance hole of $1\frac{1}{2}$ inches in diameter, and the bottom made slightly concave. But for these little Parrakeets several nesting-boxes can be made in one as they are gregarious and very sociable and do not object to their nesting-holes being only a few inches apart.

Nest-boxes should always be fixed high up on the walls of the covered portion of the aviary, preferably in a corner as far away from the door as possible and somewhat hidden by brush-wood.

Perches should be freely supplied, and should consist merely of strong branches of trees securely fixed to the walls or roof. If perches or seed-tray are hung from the roof by a stout wire, this should have a stick wired on to it to make it visible to the birds, and so prevent them flying against it, as they might do if the wire were practically invisible.

The floor of the shed should be covered with clean sharp sand, and in one corner there should be a small heap of old lime-mortar.

If a fountain, with proper supply and drainage, is provided in the outer flight, no water will be necessary in the shed, unless the birds are for any reason shut in, when of course water must be supplied in a clean dish such as a glazed flower-pot saucer.

PART II.

It is of course impossible in the space at my disposal to deal with anything like all of the Parrakeets that the enthusiastic student of these birds will have an opportunity of possessing, providing he keeps touch with the dealers' importations and private advertisements, so it will be best to deal briefly with the most popular.

THE BUDGERIGAR (*Melopsittacus undulatus*) is the most popular of all the Parrakeets, and it well deserves its fame, for it possesses just those qualities which the aviculturist most desires, namely, beauty, vivacity, hardiness and prolificacy. The only quality it does not possess, and one which the more experienced aviculturist looks for, is rarity. When the first of these little Parrakeets were brought to this country, more than half-a-century ago, they naturally commanded a very high price; now, however, about six shillings will secure a good pair.

In one of the compartments of the aviary described, about half-a-dozen pairs of Budgerigars could be kept. For food they require only canary seed, and no artificial warmth is necessary in the winter. It is desirable to separate the sexes from October to the beginning of April, as otherwise they will breed practically the whole year round, and the hens will be liable to die of egg-binding during the cold weather. Moreover, the nests get damp in the winter and the young suffer.

It is advisable to supply two nest-boxes for each pair of birds so that there may be a choice of sites and quarrelling will be avoided.

The Budgerigar is almost too well known to need any description. It is mostly bright green with black wavy cross-

bars over the back. A yellow face and blue tail. The cock has a bright blue cere over the beak; in the hen this is brown, while in the immature bird it is dull bluish in both sexes.

There is a common variety of the Budgerigar, which has been produced by selection, which is almost entirely yellow, the dark pigment having disappeared from the plumage. Yellow Budgerigars are now so common that the price is little higher than that asked for the normal bird.

An extremely rare and beautiful variety is the Blue Budgerigar. It was known some twenty-five or thirty years ago, but completely disappeared until Mons. Pauwels, a well-known Belgian aviculturist, exhibited a pair in London in 1910. In this variety the yellow pigment is absent, the bird being of a most beautiful blue, with a pure white face and black bars over the back.

The COCKATIEL or COCKATOO PARRAKEET (*Calopsittacus novæ-hollandiæ*), of Australia, is another popular favourite, almost as well-known as the Budgerigar, and equally hardy. It is about the size of a Thrush but with a longer tail. The male is dark-grey with a yellow face and crest, a white patch on the wing-coverts and a brick-red patch on the cheeks. The hen is quite different in colour, being brownish, with the underside of the tail barred with yellow.

One pair of Cockatiels can be kept in the same compartment as Budgerigars, with which they will agree, although they would disagree with others of their own species or parrakeets of about the same size. They are very free breeders, laying from four to six white eggs to a clutch, and producing three or four broods in a season. Both sexes share in incubation, the cock sitting by day and the hen at night, and incubation is commenced with the first egg.

Canary, hemp and oats are the only seeds required, although these, and, in fact, all parrakeets require green food.

The BROAD-TAILED PARRAKEETS (*Platycercus*), of Australia, are mostly quite hardy, brightly-coloured and very desirable birds for an aviary. They require the same food as that recommended for Cockatiels. Each pair should have a compartment of an aviary to themselves, and if provided with suitable nesting

WILD SWAINSON'S LORIKEETS IN NORTH QUEENSLAND.

accommodation and left undisturbed, will probably breed. The following species belonging to this group may be mentioned. The ROSELLA (*P. eximius*), PENNANT'S PARRAKEET (*P. elegans*), the MEALY ROSELLA (*P. pallidiceps*), the STANLEY PARRAKEET (*P. icterotis*), BROWN'S PARRAKEET (*P. browni*).

The genus *Psephotus* contains some of the most beautiful and desirable of the Australian Parrakeets. The best-known being the RED-RUMP (*P. hæmatonotus*), a hardy and free-breeding species. The MANY-COLOURED PARRAKEET (*P. multicolor*) is fairly hardy, and has been bred by several aviculturists. While of the rarer species there are the very distinct BLUE-BONNET, of which there are two races (*P. xanthorrhous* and *P. hæmatorrhous*), the BEAUTIFUL (*P. pulcherrimus*), the GOLDEN-SHOULDERED (*P. chrysopterygius*) and the recently-described HOODED (*P. cucullatus*), the three last mentioned being extremely rare and rather delicate.

There are many other desirable seed-eating Parrakeets in Australia, such as the KING (*Aprosmictus cyanopygius*) and CRIMSON-WING (*Ptilistes erythropterus*), the ALEXANDRA (*Spathopterus alexandræ*) and BARRABAND'S (*Polytelis barrabandi*), as well as the beautiful GRASS PARRAKEETS of the genus *Neophema*.

South America contains a large group of Parrakeets known as Conures, most of which are comparatively hardy and easily kept on a simple seed diet and green food. They are not so popular as the Australian Parrakeets, nor, as a rule, are they such free breeders.

The PATAGONIAN CONURE is a large bird of a dull greenish colour relieved by yellow and blue. The BLACK-HEADED and RED-HEADED CONURES (*C. nenday* and *C. rubrolaryvatus*) are bright green birds with characteristic markings on the head. The CACTUS and BROWN-THROATED (*C. cactorum* and *C. aeruginosus*) are smaller, tame and confiding little birds, which make charming cage pets; while several small and pretty species are contained in the genus *Pyrrhura*, the best known being the WHITE-EARED CONURE (*P. leucotis*).

To the same sub-family belong the GREY-BREASTED or QUAKER PARRAKEET, a parrot distinguished from all others by its habit of constructing a large domed nest of twigs; the

LINEOLATED PARRAKEET (*Bolborhynchus lineolatus*), the PASSERINE PARRAKEET (*Psittacula passerina*), and the TOVI and other species of the genus *Brotherys*.

A large number of species are contained in the genus *Palæornis*, which is spread over a part of Africa, India, Burma, the Malay Peninsula and adjacent islands. The best known species are the INDIAN RING-NECKED PARRAKEET (*P. torquatus*), the ALEXANDRINE (*P. eupatria*), of which there are several races, and the BANDED PARRAKEET (*P. fasciata*). The first of these has been bred in captivity on several occasions, but, as a rule, these Parrakeets are kept merely as cage-birds, in which state they sometimes make quite good talkers.

Confined entirely to the African Continent and Madagascar is the small group of true Lovebirds (*Agapornis*), all of which have short rounded tails. The chief peculiarity of the group is that they make their nest by lining the hollow of a tree-trunk or limb with some material such as dry grass or the soft green bark of trees. The three well-known species are the RED-FACED (*A. pullaria*) from West Africa, the ROSY-FACED (*A. roseicollis*) of South Africa, and the GREY-HEADED (*A. cana*) from Madagascar; while the recently-discovered BLACK-CHEEKED LOVEBIRD (*A. nigrigenis*) from Rhodesia, is, at the moment, perhaps the commonest kind in captivity, being an extremely free-breeding species.

There still remains to be mentioned the large family of honey-eating Parrakeets which inhabit Australasia and are known as the Lorikeets. They are a restless active group, mostly clad in brilliant colours. Their natural food consists of the sweet nectar and pollen of flowers, principally that of the various species of Eucalyptus. But they also partake largely of fruit, and are in consequence a great trial to colonial fruit-growers. In captivity they are not, as a rule, difficult subjects. They should be fed upon sweetened milk-sop, which is made by pouring boiling milk upon plain biscuit and sweetening with cane sugar. Ripe fruit in season is also essential. Some species are fairly hardy, but in the writer's opinion it is advisable to allow them to have access to a warmed compartment in cold weather.

Lorikeets are not very free breeders in captivity, but several species have reared young. For a nest the ordinary parrakeet nest-box as described above is all that they require.

SWAINSON'S or the BLUE-MOUNTAIN LORIKEET (*Trichoglossus novæ-hollandiæ*) is the best-known species, and makes a delightful aviary bird, brilliantly clad in green, red, blue and yellow. It is a common species in the Eastern parts of Australia.

The RED-COLLARED LORIKEET (*T. rubritorques*) is the north-western form of the last-mentioned, while the ORNATE LORIKEET (*T. ornatus*) comes from Celebes.

The closely-allied genus *Psittenteles*, which is doubtfully distinct from *Trichoglossus*, contains birds which differ chiefly in the absence of any red colouring in their plumage, being chiefly green and yellow. The SCALY-BREASTED LORIKEET (*P. chlorolepidotes*) inhabiting the South-east of Australia is a well-known member of this genus. Another denizen of the same region, but one rarely imported on account of its reputed delicacy when first captured, is the MUSKY LORIKEET (*Glossopsittacus concinnus*) a charming bird that is not difficult to keep under proper treatment.

In the foregoing very brief sketch of a most delightful group of birds it has only been possible to mention the mere names of a few of the species that can be kept in this country. For a more complete account of these birds I would refer the reader to my book entitled *Parrakeets*, which deals exhaustively with the imported species.

V.

HAWKS AND OWLS.

By J. LEWIS BONHOTE, M.A.

I. HAWKS.

Although not, properly speaking, cage birds, this Order includes, to my way of thinking, some of the most fascinating of birds. Probably from their use in the royal sport of Hawking they were one of the earliest birds to be kept in confinement (excepting, of course, fowls, pigeons and ducks, and possibly the Brush Turkeys) and their extreme reluctance to breed in confinement has probably been the most powerful factor in preventing their domestication. In spite, however, of the many centuries during which they have been kept by man, there is perhaps no group of birds that, considering its very simple needs, has been so misunderstood, and owing to this, but a very small percentage of the individuals seen in Zoological Gardens are in what one might consider really good trim. I am not dealing in this article with Hawks used for hawking, they naturally need a treatment to suit the purposes for which they are required, and to any readers who may wish to keep them for that purpose I may refer them to Mr. Harting's valuable book on the "Practical Management of Hawks."* We have, however, to consider the keeping of these birds in large cages or aviaries in which much active exercise is impossible. To keep a Hawk as kept by falconers on 'jesses' tied to a perch or block is, if it is not being used for hawking, cruel and unkind.

* *Practical Management of Hawks*. Second ed. 8vo. London, 1898.

Photo by J. L. Bonhote.

BAHAMA OSPREY (ADULT)
(*Pandion carolinensis*.)

Diurnal birds of prey, which are for purposes of this article included under the rough and inaccurate term Hawks, may be divided into three main groups—Vultures, Kites and Hawks proper. The former feed entirely on carrion, the Kites chiefly on carrion, while the Hawks proper always catch and kill their own prey. Of these three groups the latter are the most delicate, and thus, if we treat the two hardier groups as we do the most delicate we shall err, if indeed we err at all, on the safe side.

In our treatment of these birds, the first popular delusion which must be dispelled is that these birds are hardy, and that all they require is a cage with or without shelter, and a little food daily. This is a very great mistake; true they are not difficult to keep, but unless properly kept, although they may not actually die, they will never look nice and always be out of condition.

In the first place, let us see how they live when wild, that we may have some wrinkles as to their requirements in confinement. Although having perforce to seek their prey in cold, bleak and open situations, their actual home is either the gullies of some steep and broken cliff or in the tall trees of some huge forest, and, when not actually hunting for their prey, they are extremely sedentary birds. The capturing of their prey again is no certainty, and many attempts have sometimes to be made before success brings a well-earned meal. The meal, however, being once procured is a good and substantial one and sufficient to last the captor two or three days before the pangs of hunger once more drive him to the chase. Further than this, in their methods of feeding, bones, fur and feathers become swallowed together with the more digestible portions of their food; these, by the action of the stomach, become collected into a pellet and subsequently ejected, and it is not until some time after the ejection of the pellet that they require another meal. Compare this mode of life with the usual conditions under which these birds are kept in confinement. A large open cage, exposed alike to sun, wind and rain, without any shelter, so many ounces of cold raw meat given daily whether required or not, opportunities for casting pellets but seldom supplied, and, if supplied, the next meal served punctually to the hour, regardless of whether Nature demands the food or not. Is it to be wondered

at, therefore, that the birds of prey at most Zoological Gardens become dull, listless and apathetic, often 'hanging' in their moult and generally with broken wings and tail. Yet such are the facts.

We have already pointed out that, in a wild state, Hawks spend much of their time sitting in some fairly sheltered place till the need of seeking a fresh meal puts them on the move, and in captivity we must as far as possible try to imitate these conditions. In the first place, the aviary must be in a sheltered spot; it is quite useless to have an open flight with an elaborated devised house, as but few Hawks will enter the shelter of their own accord, and, moreover, being of a rather wild disposition there is a great tendency for them to break their flights and tail, and also to damage themselves if kept entirely in an open flight. The ideal aviary is one which is only open in the front and boarded at the sides, top and back. It should be provided with two perches placed end on to the observer at a moderate height from the ground and a fair distance apart, so that the bird must use his wings to get from one to the other. If the aspect is in any way open to cold or wet winds there should be a flap about three feet wide hinged on to the front of the roof. In ordinary weather this should be raised, but in cold and wet weather, or if it be very hot, it can be lowered to serve as a shelter and retreat. A further perch should be placed fairly high up against the back as a roosting-perch, and should only be large enough to accommodate one bird at a time. This perch must be arranged sufficiently high up so that the bird when on it may have the advantage of the shelter given by the flap when lowered. The ground of the aviary should be covered with coarse sand and gravel. In such an aviary almost any species—except some of the smaller and more delicate species—may be kept in all weathers.

Now as to food. No bird of prey should be given more than he can finish at a meal, and any food left untouched an hour after feeding time should be removed. This, of course, does not apply to freshly-caught or very wild individuals. Once a day for six days a week is as often as they should be fed, and the best time is about two o'clock in the afternoon. By this method the bird will have his dinner, rest, and then retire to

roost ; the pellet, if he is going to cast one, will be thrown early in the morning, and the first part of the day, feeling hungry, he will be somewhat restless and take a lot of exercise moving from perch to perch. Many people are apt to think that because a bird is restless he is unhappy ; no greater fallacy was ever put forward, for so-called restlessness is often his only method of taking exercise, which is as essential for birds as for men. As a rule, the only way to get a captive bird to exercise is for him to have a healthy appetite, which is in turn further stimulated by the exercise. The happy and contented individual that sits preening himself all day on his perch almost invariably suffers from liver and eventually dies from an accumulation of superabundant fat.

No birds, however, are so lethargic and 'livery' in captivity as birds of prey, and hence it becomes essential if they are to be kept not merely alive but in the 'pink of condition' that details in the structure of their aviaries and their diet should be carefully attended to. This brings us to the all-important question of diet ; if possible to obtain, nothing can excel fresh birds, rabbits or rats, but in most cases such a diet cannot, apart from expense, be easily procured, and so we are driven to butcher's meat. On this, however, most species will live well, provided they are given good, sound, lean meat, with as little fat as possible. Although some people use 'lights' or 'liver' I have very little faith in it, though it may be given for a change, but, apart from their nutritive properties, this food is too soft, and the bird loses the exercise gained by pulling to pieces good, strong meat.

Another food extensively used by some is fowls' heads, these are chiefly skin and bone, and as the bones are too large and of the wrong shape for a Hawk up to the size of a Peregrine this food is chiefly useful to give the bird a certain amount of feather and a good deal of exercise. For five days in the week, however, good lean meat is the best and most suitable food ; on the sixth day the bird should be given some fur or feather—bird, rabbit or rat—in order that it may cast a pellet. In default of 'natural fur' a good substitute may be made by cutting up tow in lengths of about an inch and mixing it with the meat ; this

plan is, I believe, followed in the Giza Zoological Gardens with excellent results. Fowls' heads, *in addition to* the usual rations are very useful here, but whatever 'fur' be given the bird should on this day have a gorge, that is to say be given double rations, the remnants of which need not be removed till the next morning. On the day following the 'gorge' it should be fasted. By this means almost any Hawk can be kept in the finest trim and condition. The birds, however, will require watching during the moult, which commences in the early part of the summer, and then they will require rather more generous feeding, which has to be continued well on into the autumn, long after the moult has ceased; by November, however, a return may be made to the ordinary rations. The amount of food that should be given at any meal can be easily judged by the actions of the bird. If it has not all been eaten at one sitting too much has been given, and if, on the other hand, he is ready for more when the surplus food is being removed his dinner has erred on the 'short' side. I am afraid that when written down all this may sound very complicated, but it is not so in practice, it is quite easy to make a rule not to feed the birds on Sunday and to give them larger rations with chopped tow on Saturday, and that is all that is essential. Of course, anyone who cannot take sufficient interest to find out when his birds are in moult should not keep birds.

Next comes the question of water for bathing and drinking, for the latter purpose water is not necessary, and I cannot remember ever seeing a Hawk drink, though good observers have stated that they do, but many species undoubtedly like a bath at times, even though they are not great bathers. The best bath is a large rectangular tray, about four inches deep, which may be put in on fine bright days. Hawks properly kept are, like most birds, very seldom ill; if, however, they appear out-of-sorts I have generally found that a day without food, followed by a good meal off a freshly-killed *warm* bird or rat, and then giving them for some days as much 'fur' as possible soon brought them back to health.

The species of Hawks, though numerous, are all so alike in habits that the same treatment will do for all, especially the larger kinds. There are, however, some delightful small species,

which are rather delicate and require a little more care. Firstly, we have the SPARROW HAWK; this species rarely does well or lives long in confinement and is also extremely wild. It will not live on butcher's meat, and does not care for rats and so small birds are the only food on which it will do well. The MERLIN is 'par excellence,' one of the tamest and most delightful of our native Hawks. Young ones reared from the nest make charming pets, but generally die during the winter; however, if given plenty of tender meat (birds and mice) and kept in an indoor aviary where they can take plenty of exercise during the bad weather they will do fairly well, but I have never found them very long-lived.

The HOBBY, RED-FOOTED FALCON, AMERICAN SPARROW HAWK (in reality a Kestrel) and several other small species may sometimes be procured. These must all be taken indoors during the winter or a glass front fixed to the aviaries already described. They should be given as many small birds and mice as possible, and also beetles or other similar insects. When given butcher's meat it should be cut up into small pieces.

Hawks do very much better if kept in separate aviaries, as when several are kept together the strongest almost invariably take the lion's share of the food; but if several are kept together the same number of pieces of meat must be given as there are birds, no more and no less, for if they are keen on their food, as they should be if in health, they will not settle down to feed till all the food is gathered up and an extra piece leads to fighting and quarrelling. Another reason against keeping several together is that in autumn, when the birds get ravenous, the weaker are almost certain to be partially starved and possibly killed outright, though this is not very often the case.

Kites and Vultures have quite different habits and may safely be kept together, as may also Owls, except in spring and autumn, when they must be carefully watched.

Hawks are said to be extremely shy breeders in confinement and, except for the Kestrel which has been known to nest about three times, I can find no records of the successful breeding of other species. Personally I do not think there would be much difficulty in inducing these birds to nest, provided they were

given a suitable place and that a pair could be got to live together. They should be introduced to each other in late autumn and kept together during the winter, being turned out into their breeding aviary early in spring. Few people, if any, have tried to breed them, and captive Hawks are seldom in breeding condition.

The BLACK KITE has laid and hatched with me on several occasions, both in a large barn and in a comparatively small aviary, and Vultures have been known to nest not infrequently.

It is hardly necessary to add any special remarks on Kites and Vultures, they are much hardier than Hawks and will live peaceably together. Being by nature carrion-feeders they are not nearly so particular as to their food, and it is not so important to give them fur every week. On the other hand, they are much more greedy and lazy than a Hawk, and care must be taken not to overfeed them; in other respects, if kept in the manner described for Hawks they will thrive and in all probability breed.

* * *

II. OWLS.

Beyond the fact that the majority of Owls are raptorial birds, they have no other claim to be considered in any article dealing with Hawks. From their similarity of food, however, they may be kept in confinement in a manner similar to the diurnal birds of prey. They are not nearly so wild or so liable to knock themselves about as Hawks, so that if necessary their aviary may be wired at the top and sides, but we find that they undoubtedly keep in better condition if their aviary be covered in; it is, however, unnecessary to have the front flap. They must be provided with a closed-in box, having merely a large hole by which they can enter, and the box should have the bottom of one side hinged to facilitate cleaning out. Certain species, such as the EAGLE OWL, SHORT-EARED OWL and several others will not enter a box, and in these cases the front flap should be used, but it may be permanently fixed down in order to provide a dark retreat during the day. The feeding should be precisely the same as for the Hawks, except that as they feed at night it is advisable to feed them late in the afternoon and remove the surplus food, if any, in the morning.

Photo by D. Seth-Smith.

BURROWING OWL
(*Speotyto cunicularia*).

Photo by W. Farren.

SPOTTED EAGLE OWL, FIVE WEEKS OLD
(*Bubo maculosus*).

Several Owls may safely be kept together, but as most species breed readily in confinement they should be separated into pairs in the spring, or fighting (and murder) is pretty sure to take place. Birds of the same sex will live together without much fighting at all times of the year, but should a pair mate they will soon kill off any other inmates. The loss of birds in this way does not necessarily mean that they kill each other by fighting, it more often happens that the weaker are driven to one corner of the aviary from which they dare not move, and become, in consequence starved. In the autumn, Owls need a much larger amount of food and, where several kinds are kept together, unless they are very much overfed, the weaker will have a bad chance, but it must be remembered that if overfed, as is usually the case, they will never be in condition or come into breeding trim.

When breeding, they require no special attention, but when the young are hatched they should, if possible, be given nothing but mice, rats and other natural food.

Owls will do very well in an aviary with a total absence of sun, but, on the other hand, many species do enjoy occasionally a 'bask' in the sun, though it is in no way essential to their health; the same remarks apply to a bath.

Comparatively few species of Owls are commonly kept; the EAGLE OWL is the largest and finest species usually met with and nests very freely. The eggs are generally laid in March in a depression scraped in the floor of the aviary, and incubation is carried out by the hen alone. The approach of the breeding season is heralded by the almost continuous hooting, the male and female answering each other continuously and with monotonous frequency. Care must, of course, be taken when entering the cage, or even if standing near it, as both birds are at this time extremely savage. This may also be said of most species when nesting, except the Barn Owl, which I have found extremely docile, allowing itself to be lifted off her young or eggs without a protest.

Probably the most delightful Owls to keep are the SCOPS, they are small and quite inoffensive and may comfortably be kept in a living room in an ordinary cage and allowed out periodically to exercise their wings. For this and other small species the

food should be cut up into little bits as they are not very good at tearing their prey to pieces, and I have found it best to cut open Sparrows and mice. They are passionately fond of mealworms, and when flying about a room will take them from the fingers while hardly pausing in their flight, in fact, the Scops is one of the most delightful bird-pets imaginable. Several of these small Owls, however, are rather delicate and require a little artificial heat in winter.

I am afraid I have already exceeded my legitimate space, but I can heartily recommend any of the birds of prey as most delightful pets; with few exceptions (*e.g.* the HARRIERS) they will become exceedingly tame, and as they have only to be fed once a day they are essentially birds which one can feed oneself and thus get into personal touch with them in a manner not so easy with smaller species, whose food is always at hand. However tame they get, it is always as well to remember that they have sharp claws, and as when thoroughly tame they often 'strike' in play, it is best to wear thick gloves when handling them.

VI.

STARLINGS.

By Dr. A. G. BUTLER.

The Starlings of the World divide naturally into three tolerably well-defined families—the NewWorld Starlings (*Icteridæ*) which appear to be related on the one side to the larger Weaver-birds and on the other to the Old World Starlings; the Old World Starlings (*Sturnidæ*) with the exception of the true Grackles, between which and the *Icteridæ* they form an intermediate group, and lastly the Grackles (*Eulabetidæ*) which are nearer to the Bower-birds and Crows in general appearance and outline.

In the first of these families the bill of the male is generally markedly longer than in the female, and the bastard primary, though well-developed, is shorter than its coverts and is therefore called a remicle. In the second family the difference in length of bill in the sexes is much less marked and sometimes hardly appreciable, but the bastard primary is longer than its coverts. From the latter family the *Eulabetidæ* (represented by *Eulabes* only) are readily separable by the remarkable difference of width in the bills of male and female, the heavy, far more Crow-like, character of the birds, and their possession of both face-wattles and neck-lappets: it is also a group of hopping birds.

I have thought it necessary to mention these points, because the affinities of groups have some relation both to their food and nidification: thus the *Icteridæ*, which come nearest to the Finches, are, as regards some of their members, seed-eaters to a greater extent than either the *Sturnidæ* or the *Eulabetidæ*; moreover they contain species with finch-like beaks, and one species

—the Bobolink, which assumes a special nuptial plumage, after the manner of Weavers of the genus *Pyromelana*. In their nidification the *Icteridæ* are quite as varied as the Finches, both with respect to the position and character of their nests; much more so, indeed, than the *Sturnidæ*, the majority of which breed in holes: the *Eulabetidæ* also build their nests in holes.

If one wishes to breed these birds, it is of course necessary to acquaint oneself with their natural methods of nidification; and, as nearly every group of the *Icteridæ* has its own method, it will be necessary to consider each separately. So far few attempts have been made to breed the New World Starlings in captivity, owing probably to the difficulty of securing both sexes, so that they offer a very promising field of enterprise to aviculturists.

The imported *Icteridæ* are referable to five sub-families, the first of which *Agelæinæ* includes the Meadow Starlings and Marsh Troupials, Maize-eaters, and Cow-birds, all of which can be kept upon a seed-diet; but the more slender-billed forms, for which I have reinstated the generic name *Agelæsticus*, do not live long upon that food, but need to be treated like Bulbuls, Tanagers and other fruit-eating insectivorous birds; they also differ from the broader billed species in their more confiding nature, which renders them suitable subjects for keeping in roomy cages, whereas the Bobolink and other Meadow Starlings as well as the Cowbirds require a moderate-sized aviary to render them happy.

The soft food which I supply to all my insectivorous birds and which I have found more successful than any other in keeping them in health for many years, consists of two parts crumb of stale household bread, one part chicken-meal ground in a coffee-mill, one part Trower's "Improved Cekto" and one part hard-boiled egg passed through a metal potato masher: I mix the whole together in a bason and damp with water to a crumbly consistency. All my Starlings receive a handful of this mixture daily, together with a quarter of an orange or pear, about an inch of banana and two or three grapes when obtainable; strawberries or currants may also be given when they are in season, and any insects, their larvæ or pupæ, as well as spiders, which may come to hand.

Although, as I have said, it is possible to keep the more

finch-like Starlings for a considerable time upon seed alone, I do not recommend it as an exclusive diet; I think that some at least of those which I owned in past years would have lived longer under occasional soft-food treatment: unfortunately some of these had been brought home upon a seed-diet alone and I consequently found them unwilling to touch soft food.

The *Agelaiinae*, with the exception of the Cowbirds, which are parasitic, construct their nests, as a general rule, on or close to the ground near water; or in reeds, rushes and other aquatic plants over water; one or two however place their nests in low trees or bushes, or even on the leaf-sheaths of palms. Attempts have been made to breed Cowbirds by turning them loose among many other nesting birds, but they did not avail themselves of the opportunity thus offered of securing foster-parents for their young.

The *Sturnellinae* or typical Troupials do best in a moderate-sized aviary: their natural food consists of seeds and insects and therefore they are better suited to a seed diet in captivity than any other Starlings excepting the more finch-like members of the preceding Subfamily. I kept De Filippi's Troupial chiefly upon seed and cockroaches, as I did also the Bobolink, the Red-breasted Marsh-Troupial, the Brown-headed Meadow-Starling and the Silky Cowbird: I also attempted to keep the Yellow-shouldered Marsh-Troupial on the same diet, because it did not take kindly to soft food, but my later experience with the allied Flame-shouldered species proved this to be a fatal mistake.

The Glossy Black Troupials or American Grackles (*Quiscalinae*) are powerful birds which build open cup-shaped nests either in dense or shrubby trees, low bushes, reeds, matted grass-tufts, or holes in trees or banks, usually near to or over water; mud is frequently used in the structure. The birds feed not only upon seeds and fruits, but also upon eggs and young of other birds, frogs, newts, fish, molluscs, crustaceans, spiders, insects and worms, so that their diet in captivity should contain a moderate amount of animal food, shredded raw beef being only given when no small dead birds or other vertebrates are available.

The Cassiques (*Cassicinae*) are again large birds, most of

which form pensile purse-like open net-work nests swung from the branches of tall trees or rarely large bushes overhanging water; but the Black Cassique (*Cassidix oryzivora*) is parasitic, laying its eggs in the nests of other species; the last-mentioned bird feeds in its wild state upon seeds and insects, but the purse-builders are all fruit and insect eaters and should be treated like the typical Hangnests in captivity.

The Hangnests (*Icterinæ*) construct pensile long, openly woven, purse-like nests which are suspended from the branches of trees or bushes; their food consists of fruit, insects, spiders and worms; and in captivity soft food, fruit and an occasional insect will keep them in perfect health and plumage, until eventually they die from sheer old age. These are the most confiding, clever and attractive in every respect of all the New World Starlings, and, provided that one could obtain both sexes, there seems not the least reason why they should not be bred in an outdoor aviary without difficulty. The sexes are easily distinguished, even where the plumage does not differ, owing to the very marked difference in the length of the bills of male and female.

It is dangerous to associate the species of *Icterus* with other birds, as they have very strong and pointed bills and are aggressive. When kept in a cage it is not safe to bring one's face too close to the wirework; for these birds, like all Starlings, are attracted by anything bright and might stab one's eyes; children should therefore be cautioned not to go too near.

The Old World Starlings hitherto imported belong to the Subfamily *Sturninæ* and, as already stated, mostly nest in holes, in trees, rocks, or buildings; but the Glossy Starlings of the genus *Calornis* construct pensile nests after the manner of the Icterine species and lay spotted eggs like many of those birds (as well as other Glossy Starlings) for which reason I regard them as probably the nearest allies to the New World family.

The species of *Calornis* feed upon seeds, other vegetable matter and probably insects; the African Glossy Starlings also feed upon fruits, berries, seeds, insects, and of course spiders. In captivity, therefore, these birds should be treated like the Icterine Starlings. The typical Starlings (*Sturnus*) and the Star-

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BALDHEADED STARLING
(*Sarcops calvus*).

ling-like Mynahs (*Poliopsar*, *Sturnopastor*, *Dilophus*, *Temenuchus*, *Graculipica*, *Acridotheres* and *Sarcops*) can be fed in the same manner with the addition of earthworms; the species of *Acridotheres* will also eat small mice,* so that it is probable that, in their wild state, they take toll of some of the smaller reptiles and batrachians: they are very eager for locusts, grasshoppers, crickets and cockroaches.

The typical Mynahs or Grackles (*Eulabetidæ*) are somewhat delicate when first imported, or perhaps they are (more often than not) supplied with too much shredded raw beef for their good. They feed in their wild state chiefly upon fruits and berries, though doubtless they also take insect-food, since in captivity they accept it eagerly. The so-called "Hill Mynahs" should therefore be treated like the species of *Icterus*, but owing to their great size and voracious appetites they naturally require a much more liberal supply both of fruit and soft food.

Apart from the imitative powers of *Eulabes* I do not consider them attractive as pets; they are dull and clumsy in their movements, dropping from branch to branch with a heavy hop, even more carefully taken than that of a Satin Bower-bird or a Crow, to both of which they bear some resemblance in outline. In my opinion these birds should never be confined in cages; a small aviary with the companionship of a few other smaller birds suits them well. I did not find *Eulabes* aggressive, it struck me as too apathetic and lazy to exert itself sufficiently to be objectionable to other birds, in which respect I should say it was unlike the Bowerbirds and Crows. I do not of course know what it might do if associated with tiny finches; possibly it might acquire a taste for feathered food in that case: one cannot safely prophecy what might or might not happen.

Unless it is intended to breed them, all the smaller Old World Starlings are better kept in roomy cages, just sufficiently large to enable them to use their wings and bathe freely.

*My Crested Mynah was very fond of young mice taken from nests which we discovered on various occasions.

VII.

TANAGERS.

By S. M. TOWNSEND.

To write an article on Tanagers! What a tremendous task! A bird lover with a ready pen could fill volumes, it is such a vast subject, but mine is an unready pen and now when I wish to start, I cannot think what to write about. Besides now that I have kept Tanagers some years I am beginning to know how much I still have to learn about them. It is strange that the beginner, or the person who has never kept a Tanager, always has more confidence; I, for instance, started with a Superb and Violet, and if I had parted with them at the end of a few months, and never kept another Tanager, I should have been ready to agree that they were quite hardy.

Tanagers are most interesting birds to keep as pets, as they are beautiful to look at and, in the majority of cases, very intelligent and full of character. In all the years I have kept them, I think I have only had one that never learned to know me or take kindly to cage life, and though I do not look upon them as hardy birds I think with careful treatment they can be kept to a ripe old age.

My experience of keeping them is only in cages, so I suppose I ought not to criticise others, but it will take a great deal to convince me that *Calliste* and some others can be kept out of doors all the year round with impunity. Occasionally one hears of a Superb wintering out of doors, but it is rare to hear of that Superb having successfully moulted the following year, the strain on its constitution having been too great,

Another difficulty I find in writing about Tanagers is the wide difference in individual birds of the same species. Take for instance the Violet. If you buy one one week and write out a bill of fare for it, from what you have observed that it takes to readily, it does not follow that the same bill of fare will do for all Violets, the next one you get may be a bird of entirely different tastes and absolutely decline to touch the provisions enjoyed by the first. I think the best plan with a newly-bought Tanager is to follow no rule, but to try different things in the way of food and fruit, and you will soon see what it likes and what seems to suit it the best.

While I am on the subject of buying I may say I have found it the best plan not to go for the bird in the best condition, with regard to feather. A bird just come over in a large consignment, that has a bright eye and a fairly plump chest, though he may not have a whole feather on him, is very often worth six birds that are in apparently perfect plumage but have breast bones like a knife edge. Again I would much rather be in time to buy a Tanager in the dirty state it arrives in, it is so much better to get it like that, before anybody has had time to try and clean it up for sale. I do not like my birds to be dry cleaned.

Having bought the bird I get it home as quickly as possible, put it in a cage by itself, give it some slightly tepid water, sometimes with a little port in it, if the bird seems run down and a choice of fruit and some insectivorous food, and keep it as quiet as possible, only watching to see that it finds its way to the water, etc. I keep it like this, away from all other birds, for a fortnight or more, according to its condition; when it has a clean bill of health, I take it up in the birdroom and look round for a suitable companion for it, this is a difficult task, as there is always a great uncertainty as to what birds will agree together, but I think it is better to have two birds together, if you have a large enough cage, it promotes exercise and stops over-feeding. With two Tanagers in one cage, if one of them is over fond, say of ants' cocoons, the other will probably prevent him from picking them all out of the food at once, and he in his turn will perhaps prevent the other from eating half an orange, or banana, at a sitting, as some Tanagers seem to want to do. One of the

greatest things to guard against with Tanagers is their getting too fat and it is sometimes very difficult to see this in time, because sometimes a fat bird will hold himself so sleek and trim, that he looks slimmer than a thin bird, who does the reverse; so the great secret is to keep a careful eye on them and directly you see anything wrong with the eye, or breathing, or any signs of diarrhœa, or constipation, you must take steps at once and make a radical change in the food, and perhaps give a dose of Epsom salts, or any other simple remedy to meet the case. I have been laughed at very much, by some medical men, for my attempts at doctoring, but I have certainly had some remarkable cures.

Tanagers are such a large family that it is hard to say, where they begin or where they end. To the ordinary lay mind it is difficult to trace any sign of Tanager in the Magpie Tanager, whose beak is decidedly Shrike-like, but in captivity at any rate, it does not live up to its appearance, either in habits or feeding, though I have seen mine hold a grape skin with its feet and tear it, but I am much more content to call it a Tanager, than I am to accept the decision of many, that the once called Rufous-throated Tanager is a Sugar-bird, I have watched mine very carefully, but I cannot find any likeness to a Sugar-bird in him.

The way Tanagers are imported into this country makes it almost impossible to say which are hardy, and one ought to be very careful in making statements about individual birds, though some people think a bird hardy if they keep it for six months. Take for instance the White-capped Tanager. The Zoo had one for many years and my own is still alive, now these birds are but seldom imported, yet I know some have arrived, but we do not hear of them living, still they may be, as there are many aviaries whose inmates are never heard of. The Magpie Tanager I bought years ago was a single importation and was very healthy and lived very well, but I have since seen others arrive and die off very quickly.

Tanagers sometimes arrive with one, or sometimes both eyes filmed over, very like a cataract, some think this is caused by the birds knocking their heads coming over, but I think it is because the birds are put into dirty cases and when they want to clean their beaks, they rub them along the dirty perch and get

RUFIOUS-THROATED TANAGER
(*Glossiptila ruficollis*).

some poisonous matter in the eye ; but at any rate the novice will be wise to leave such birds severely alone, though some dealers will assure you that the bird will soon lose that ; but then according to some of them a bird will recover from anything. I remember once finding a bird in a fresh consignment, that I had been on the look out for for a very long time. I jumped at it and put it in a small cage, but when it turned round, I saw one eye was injured, it had very much the appearance of a film over it, but I could see that the eye ball had been damaged by another bird, I was assured that it would soon be allright, but I did not buy it. However, it was sold, and about a fortnight after, the dealer told me he had heard from the lady who had bought, it that the bird could see, and the eye had almost recovered. Unfortunately for the truth of his story I came across the buyer of the bird, quite by accident, about eight months afterwards and was told that the eye never changed in appearance and the bird had just died.

I give my birds a simple insectivorous mixture made of Spratt's Puppy Cakes ground to a meal and ants' cocoons scalded with enough water to just damp the meal, and sometimes some ground silkworms' cocoons, mixed with grated carrot and chopped lettuce, when obtainable ; this of course is freshly made each morning. I also give them plenty of ripe fruit, such as banana, orange, tangerine, apple, pear, grapes, strawberries, cherries, etc. So many of the smaller Tanagers live almost entirely upon fruit, but I always try to encourage them to eat some of the insectivorous food, and they most of them enjoy a mealworm or so during the day, but I do not give them more than this, as in cage life I think they can be overdone. Occasionally, about a teaspoonful of scalded bluebottles is mixed into the food, and I find these are much appreciated, especially in the winter months.

It is said that some Tanagers, such as the Black, can be kept on seed alone, but I do not believe it. I had a Black Tanager for some years, to which I used to give a little Canary seed, but I am sure it would not have survived long on that alone. I once had a Black-necked Tanager that never would touch anything but banana, and even that had to be exactly to its liking. If you

gave it a piece either not ripe enough or too ripe, it would go without for hours, until it was changed.

All Tanagers are particularly fond of bathing, but some to a more marked extent than others, some will lie in the bath and literally soak, before splashing in the usual way, and come out so wet, that they are totally unable to get to their top perches, and others go in and make a great splashing and hop straight to the top perch, having hardly wetted themselves at all. It is curious to notice the effect of the water on the different colours, some birds seem to change colour entirely when they are wet, a Tri-colour is one of the most noticeable in this respect.

H. Grönvold del.

THE BLACK LORY
(*Chalcopsittacus ater*).

VIII.

THE CARE AND FEEDING OF PARROTS.

By HUBERT D. ASTLEY, M.A., F.Z.S., M.B.O.U.

There are undoubtedly others who are more entitled to write upon this subject than I am, by reason of their greater experience and maturer knowledge, but I have been asked to do so, and I therefore will do my best.

Parrots are, for the most part, when duly acclimatized, extremely hardy, and thrive better in fresh air and a not too artificially heated atmosphere, than in ill-vented rooms or glass houses.

This applies especially to the smaller Parrots and Parrakeets. For example, I have had such birds as Red-capped Parrakeets (*Porphyrocephalus spurius*), Cockateels, Stanleys, Port Lincolns and Pennants passing the winter entirely out of doors, with only shelters, and those unheated. The gloss and tightness of their plumage, as well as their activity and sprightliness, testify to their robust health.

I have had to break the ice in the bathing dishes for these birds to take their baths, which they often do directly the fresh water is poured in; for Parrots delight in bathing, and the difference between a bird that has a bath and one that hasn't, is very marked.

I wonder if the inmates of the host of cages in the Parrot House at our London Zoological Gardens ever have a good syringing. It would be a long task, but perhaps in the warm weather it is done. Were I their keeper, I should make a point of syringing half a dozen each day, putting them outside to do

so, and removing the seed and sand trays first of all, afterwards sponging the cage dry before returning the food, etc.

I know a Jardine's Parrot, and on visiting it one day, I suggested to the owner that the bird looked as if a bath would improve its appearance. "I am so afraid of its catching cold," was the reply. I pointed out that it would on the contrary be more inclined to prevent its doing so, especially as it is a very tame bird and can be taken on the hand to flutter its wings and so shake off any superabundance of water.

I called another day, and the bird looked fifty times better in his plumage. Of course one must be sure that a parrot is in good health, and if it has been used to ablutions of this sort, the water (if it will not or cannot take its own bath) should be only slightly sprinkled at first. But I have Parrots whose plumage is so tight and so accustomed to a syringing, that one has to spray with force before the feathers are apparently wetted: and although individual birds do not always approve of a shower-bath at the moment, they evince great pleasure directly it is over, shaking themselves and preening their feathers and often attempting another bath in their drinking water!

It is unnatural to keep a Parrot indoors all through the year without a bath, when one thinks of the drenching tropical rains through which they fly, and the daily baths in some mountain stream or forest pool which they enjoy.

And in Australia, where Parrakeets are often far from water through a great part of the day, there must be a certain amount of dew-drenched grass through which they run and scramble when seeking their breakfast. Parrots' feet too keep in better condition if they are syringed.

Not long ago, I received a pair of Hooded Golden-shouldered Parrakeets from the Continent. They are acclimatized birds, and it was delightful to see how, when I hooked a roomy bath on to their cage, they lowered themselves into the water and splashed and splashed. One felt the vibrations of their pleasure very strongly. But newly-imported birds must not be treated in this way, not at least until they are thoroughly strong and decidedly healthy, by which time they have probably ceased to be newly-imported!

As to the food of Parrots, taking first of all such families as those of the Macaws, Cockatoos, Amazons, etc., some people recommend boiled maize as a staple supply, but they usually do well upon a good Parrot's mixture of various dry seeds, such as sunflower, oats, maize, etc. Besides this, a little Marie or Albert biscuit put in a mixture of three equal parts of boiled milk, barley-water, and water, and pressed fairly dry, is good ; and this in cold weather may be given warm in the morning. Fruit too of every kind, of course. Bananas, apples, pears, oranges, grapes, figs, etc. A piece of boiled potato occasionally, seems to be appreciated, and also a bunch of chickweed or a lettuce leaf in season. Some wood, somewhat decayed, is knawed to pieces with much interest, and I sometimes put some coarse grit in the seed-pan.

But these Macaws and Parrots should not have coffee or tea or rich cake, as are offered them, and certainly not meat. Parrots do not need to be feeding all day, for in a wild state I believe they sit for hours during the heat of the day, snoozing amongst the deep foliage of the trees, feeding chiefly in the morning and towards evening.

The smaller Parrots and Parrakeets (I am not writing about Lories, the Brush-tongued Parrakeets, for I prefer to leave that task to someone who has had more experience than I have, although I might say *en passant* that they need the mixture of biscuit sop already mentioned, as well as soft fruits), the smaller Parrots and Parrakeets, as I was about to say, will do well on Canary and millet and other seeds, with some hemp seed added in the winter, and even a very sparse addition of linseed, but they also like fruit, especially apple in winter time, and strawberries in summer, and what is almost most important, especially for the Australian Parrakeets, an abundance of salad in the shape of groundsel, chickweed, etc., etc., as well as flowering grasses, as soon as there is no frost on the ground. I generally leave off green food of this description by perhaps the middle of October (although it depends upon the weather) and recommence it *with care* in the middle of February. But it must then be of a fresh growth, and not be sodden with rain, or frost-bitten. Chicory leaves are beneficial in winter-time, if grown in a frame, but great care must be taken at that season of the year.

From March to October, my Parrakeets usually have an abundance of green food put fresh every day into the aviaries, and a nice bunch into each cage. Where there are Budgerigars and such like, a large bouquet of grasses, etc. can be wired round a stout stick, which can be fixed in a flower pot. If the bunches are wired round the stems, it enables the birds to pull at what they want, as if it was actually growing, and at the same time prevents the stuff from being scattered untidily about the aviary. I believe my young Bourke's Parrakeets, etc. are fed almost entirely upon half digested green food and grass seeds, and they usually leave the nest in the pink of condition. After all, it is their natural food, and consequently most necessary.

And Parrots need water to drink, care being taken that the water vessels are well scrubbed out, and even scalded; for one sometimes sees them with a nasty slime at the bottom, which must assist in generating microbes of some kind or another.

Parrots, like all birds, need wing exercise to keep them healthy and robust, although one sees individuals living in cages year in and year out, who are never able to stretch and flap their wings: and Parrots are as swift and agile on the wing as any other birds. I have an especially tame Queen Alexandra Parrakeet (*Spathopterus alexandræ*, as it is dubbed!) which is kept in a cage, but is let out at least twice a week for a fly in a large room. To see that bird swoop round and round for two or three minutes at a time, shrieking with joy and exuberance of spirits, is delightful. If possible the larger Parrots and Cockatoos should be trained to come on the hand, or at any rate on a stick, when they can be waved up and down to make them flap their wings. They will soon learn what they are intended to do, and look out for these gymnastics.

I know a lover of Parrots, who always takes Macaws and Amazons for walks in the garden. They are chained to perches, and after removing them from the latter, he will put them on the ground, holding their chains, and allow them to walk in the wet grass, or else sit on an old stone wall, where they sun themselves and chew mortar.

A Double-fronted Amazon which I have, loves to be taken on a personally-conducted tour like this, and when he is put on

a railing and syringed, he brings his wings completely forward in front, so that they actually meet, whilst he ducks his head down on to his breast beneath his wings, as much as to say, "I like it on my wings, but I cannot stand it in my eyes and mouth."

Certain species of Parrots must necessarily be kept in artificial heat during the cold months of the year, but it is astonishing what some, which one would think might be delicate, can stand. Parrakeets from Northern Australia are certainly tender.

As for the nesting of Parrots in an aviary, the fewer there are the better, and in some cases one pair only is advisable. If the aviary is large enough, and they can be obtained, old hollow limbs of trees put up upon cross beams are helpful towards encouraging the birds to breed, but there are many ways of making nesting-boxes.

Parrakeets like to get into semi-darkness to lay their eggs, and if they can whittle the natural rotten wood within, all the better. Whatever the hollow is, it must not be too spacious or flattened where the eggs will be laid, or they may roll out beyond the parent bird. It is best to put nesting boxes of various sizes and shapes, for what one pair of birds may take a fancy to, another may not.

All Parrots nest in hollow logs or banks, laying their eggs in a depression on rotten and chipped wood, except perhaps the Quaker Parrakeet, which builds a roofed nest; whilst Love-Birds (*Agapornis*) use twigs, which they carry into a nesting-box or log.

For Budgerigars cocoa-nut husks do well, but it is advisable to either cleanse or destroy these after a while, for fear of red mite, etc. within. In any case, the nesting-boxes must be roomy enough for the young birds to keep in until their due time arrives for flying, otherwise they may crawl out and fall down with disastrous results, but the boxes must not be so deep that they cannot get out at all.

Parrots and Parrakeets will often take a year or more, and even three or four before they nest, so that if any aviculturists have a pair of birds about whom they are beginning to feel disheartened in this respect, let them be patient and they may be finally rewarded.

IX.

LIVING FOOD FOR INSECTIVOROUS BIRDS.

By Dr. A. G. BUTLER.

All aviculturists who have attempted to breed insect-eating birds have spoken of the difficulty of obtaining a sufficient quantity of suitable food for this purpose: this is partly due to want of knowledge of those insects, their larvæ, or pupæ, which are suitable for the purpose; partly to ignorance of the best methods of obtaining these in abundance. I therefore propose in the present paper to indicate first what kinds to select and then to explain how they can be acquired.

Spiders are not true insects, but all of them are much sought after by insectivorous birds and are greedily devoured: they are moreover the best medicine for ailing birds and have saved the lives of not a few of my pets when they were too ill to be tempted by any other food. Four or five of the common garden spider (*Epeira diademata*), or failing these two or three examples of a common greenhouse spider (*Tegenaria atrica*), or even the repulsive looking house-spider (*T. domestica*) with its wide spread of legs will speedily restore a sickly bird to health and activity.

Birds have not the slightest fear of spiders, but rush upon them with the greatest eagerness as soon as they are offered, even that ugly little beast (*Dysdera cambridgei*) being most attractive to avian taste. Harvest-spiders (*Phalangidea*) are also accepted, although not with the same enthusiastic pleasure.

When one considers that the food of spiders consists entirely of insects, one can understand that when eating an

Arachnid a bird gets insect-food in a concentrated form ; therefore, although I was scoffed at some years ago for speaking of spiders as a sort of bird's Bovril, I don't think the comparison was in the least degree a ridiculous one.

Of the Myriopoda, which also are not insects, the centipedes are eaten with avidity, but the millipedes are refused. The broad centipede (*Lithobius forficatus*) is sometimes met with when separating a cask of flower-pots for greenhouse work, but these little animals are not so abundant as to be of great importance to the aviculturist ; nevertheless they should not be thrown away when much food is needed for rearing young birds.

Of the *Thysanura* the abundant little so-called "Silver-fish" (*Lepisma*) may often be obtained in abundance under boxes or tins or even in the mealworm-pan, and though it is so active and brittle that it cannot well be picked up and offered to a bird, it may be brushed into a basin and the latter placed in an aviary when the whole collection will speedily be devoured.

Mayflies (*Ephemeridæ*) and caddis-worms (*Phryganeidæ*) are, as is well-known, favourite food for all insect-eating creatures, the latter can be obtained in a dried form from Germany and from some of the English dealers, but in this case they must be scalded before they can be used as they are very hard when received in their tinned form. The smaller Dragon flies are eaten, but are not easily obtained in quantity.

Termites or so-called White-ants would be excellent food for our pets if we could only get them preserved in quantities : they are one of the plagues of tropical countries and could easily be collected and dried for importation as bird-food, but nobody seems to have had sufficient enterprise to make use of them. Earwigs (*Euplexoptera*) are well known to be acceptable and these can easily be obtained in the autumn, by crumpling up paper and ramming it into a flower-pot inverted over the sticks or stakes used as supports for Delphiniums, Dahlias, &c. Remove the pots to an aviary or large cage and open the paper, when the insects will drop out in numbers and form a pleasing variety in the dietary of your insectivores.

The Orthoptera generally are acceptable to birds, but in this country few can be secured even in fair quantities ; perhaps

grasshoppers are most numerous, but only in certain districts, while crickets seem only to abound in the kitchens of old houses: yet why locusts, which are a plague in the tropics, are not dried, deprived of their legs, heads, and wings, and ground into meal as food for cage-birds, is a mystery: surely they would pay for importation. In meadows of long grass where grasshoppers occur, they might be swept up with a butterfly-net, emptied into glass bottles, and turned out for the delectation of an aviary of insectivorous birds. This reminds me of the value of the entomological sweeping net, of canvas on an iron ring, for collecting quantities of small insects, their larvæ, and spiders, from weed-filled ditches and hedgerows: sweeping the herbage with a net of this kind one secures a vast store of insect-life in a very short time; and, for Warblers and other small birds, a collection of this kind is invaluable.

The Cockroaches (*Blattariæ*) are excellent food for all insectivorous birds, although some birds will only accept them in the very young larval stage; the commonest form *Periplaneta americana* may be easily captured in hundreds with the ordinary so-called beetle-trap. In Madagascar a gigantic species is common and if imported and bred in a greenhouse would doubtless be most useful for feeding the larger species such as Mynahs, Bower-birds, Crows, &c. It is a most curious insect with feet padded like those of a cat, for which reason I gave it the generic name *Æluropoda*; the largest specimens are from 69 to 73 millimetres in length, and 31 to 34 millimetres in width at the widest part of the body, or the size of a tolerably large mouse.

The plant-bugs, with the exception of the Aphides (green-fly) are not generally much liked by birds, but there are exceptions, as in the case of the so-called Water-boatmen (*Corisidæ*) of which vast quantities are imported from Mexico under the name of "dried flies" and form an ingredient in all the best insectivorous mixtures put upon the market. I believe these insects are chiefly caught when flying over the water in the evening in dense clouds; but the presence of small fish among them shows that they are followed by the net even after their return to their native element. It is probable, I think, that *Cicadas* would also be acceptable to birds, but I have had no

opportunity of testing this: the *Membracidæ* to which family our cuckoo-spit (frog-hopper in its adult form) belongs, are certainly eaten when offered, and I believe that some birds will even eat mealy-bugs (*Coccidæ*).

As already stated, the smaller Dragon-flies are relished and doubtless the larger forms, when they can be captured, are also devoured by the more powerful insectivores; most Neuropterous insects are probably suitable for food, but I should think the lace-winged fly (*Chrysopa*) with its slow fluttering flight, metallic golden eyes, and most offensive smell would be an exception, which is just as well, seeing that its larva subsists entirely upon plant-lice.

Of all insects, probably the Lepidoptera (Butterflies and Moths) are most appreciated by birds, as caterpillars, chrysalides, and perfect insects, but to this general rule there are numerous exceptions of which, in the case of the more abundant species, it may be well to indicate a few:—Spiny caterpillars, like those of the *Vanessæ*, as for instance those of the Peacock Butterfly and the small Tortoiseshell (which abound on stinging-nettles) are naturally regarded as objectionable, but their more or less metallic chrysalides are eaten, as also are the perfect insects. I however object to destroying these beautiful and useful butterflies when abundance of the far commoner and noxious white butterflies:—*Ganoris brassicæ*, *rapæ*, and *napi* can always be captured with ease in our gardens after they have settled for the night upon white flowers or pale leaves. I often go round my garden in the evening and pick up quite a number of these (the only really mischievous butterflies which we have and the least beautiful) and give them to my Hangnests and other birds which will accept them. This year, when our wild birds have been hard put to it to find sufficient food out of doors, I have frequently seen Sparrows hunting down these butterflies, snipping off their wings and eating the bodies.

Hairy caterpillars like those of the Tiger and Ermine Moths (*Arctiidæ*) are not generally accepted, although the Crows, typical Thrushes and Cuckoos will eat them, the two first rubbing them backwards and forwards first to remove the hair, but the larva of the Buff-tip moth (*Pygæra bucephala*) which often is so

abundant that it strips limes and sallows of their foliage is rejected by all excepting our Cuckoo, which eats it with avidity.

Many of the larger and commoner stick-caterpillars (*Geometridæ*) are refused; not, I believe, on account of their resemblance to pieces of twig, nor because they are unpleasant to the taste, although the latter may partly explain the rejection by some birds of the caterpillar of the Swallow-tailed moth (*Urapteryx sambucaria*) when it has been feeding upon Irish ivy, but rather because they are extremely tough. I have seen some of my birds trying to break up caterpillars of this character for a considerable time and giving it up in the end as hopeless; only birds with powerful bills are successful. The black caterpillar of the Brindled beauty (*Biston hirtaria*), by no means a pretty moth by the way, is easily collected from the trunks of lime-trees, but is one of the toughest of its kind. On the other hand the little caterpillars of the V.-moth (*Halia vauaria*) a gooseberry pest, are a favourite food of the Titmice; indeed I once watched a Blue-tit for quite half an hour feeding its young upon these caterpillars alone: on the other hand the spotted larvæ of the common Gooseberry-moth (*Abraxas grossulariata*) are rejected with disgust by most birds, as well as by lizards, frogs, and spiders, although Mr. Page says that he has seen his Weavers eating them: the chrysalides of the same moth, with their wasp-like colouring are also generally refused, but the moths are occasionally accepted and my male Blue-bird was very fond of them. In like manner the caterpillars of the large white butterfly (*Ganoris brassicæ*) are generally refused, but the chrysalides and perfect insects devoured without hesitation. Size does not seem to alarm birds, for a Blue-tit in one of my aviaries captured in the air a full-sized female of the Poplar hawk moth (*Smerinthus populi*) tore off the wings and carried it to a perch to eat it; neither does the so-called terrifying attitude of certain caterpillars of hawk-moths seem to affect the nerves of birds to the slightest extent. The caterpillars of the Puss-moth, common on willows and poplars, is approached with caution by all birds excepting the Tits, which are familiar with it and recognize it as providing an excellent meal; undoubtedly its very bizarre shape and colouring and the existence of two tentacles on the last segment from which it can eject an acid liquid renders most birds wary of it.

No doubt a cabbage-field is the best place in which to seek for edible caterpillars, those of the common Cabbage-moth (*Mamestra brassicæ*) in various shades of green and brown, some of the *Apameas* and the velvety green caterpillar of the small White butterfly (*Ganoris rapæ*) being always in evidence.

Caterpillars of the Dot-moth (*Mamestra persicariæ*) common on the fronds of the well known male and female ferns are always greatly relished; they vary in ground-tint from lavender greyish, through chocolate and clay-colour to green, but may always be recognized by the dark crescentic markings on the anterior segments.

Wood-boring caterpillars are not generally liked, although the larger Thrush-like birds and probably the Crows will eat them; they, however, render the cage offensive for some time afterwards: they should prove excellent food for Black Cockatoos, since the latter eat them in Australia with relish. The perfect insect of the Wood-leopard moth (*Zenzera æsculi*) is more often than not refused by birds, I think because of its rather startling coloration reminding one a little of a Pierrot; but all the small brown night-moths as well as the more or less metallic *Plusiæ* including the Burnished-brass moth are accepted at once.

The languid white caterpillars of some of the Ghost-moths (*Hepialidæ*), which I have found in quantities feeding on the roots when removing Peonies from one part of my garden to another, are very much relished by all insectivorous birds.

The leaf-rolling larvæ of Pearl-moths (*Pyrulides*) are always eaten, as are those of the more typical Micro-Lepidoptera the *Tortrices* and *Tineina*, including even those of the common clothes-moths.

Most two-winged flies (*Diptera*) are devoured in all their stages and it is well known that maggots of the common blue-bottle fly are well worth breeding in meat and, after scouring by keeping for a day or so in sand, form excellent food for rearing young birds. It might be supposed that Sun-flies, Rat-tailed flies and Bee-flies from their more or less near resemblance to wasps, honey-bees, and humble-bees, would be refused, but in the case of the two first at any rate this is not the case, though it is a sin to destroy the first (the larvæ of which destroy plant-

lice) while the last, which fly like Humming-birds, are not easily captured: but Rat-tailed flies (*Eristalis tenax*) are easily picked off Michaelmas daisies and, in spite of their angry buzzing, are taken at once from the fingers and eaten.

By far the greater number of the beetles (*Coleoptera*) may be given to birds, but the common Stag-beetle (*Lucanus cervus*) which, when approached by a bird throws itself into an attitude of defence, raising itself on its front legs and holding its powerful mandibles wide open, makes its opponent very cautious; I think any of the Crows would be able to master it, but a Thrush seems only able to fling it on its back and then cannot break through its horny covering. The Soldier and Sailor beetles (*Telephoridæ*) are not relished by birds, nor are the tiny metallic blue Cabbage beetles (*Phædon brassicæ*) of which I once had several ounces sent to me to test my birds with; these beetles have a strong sour smell like red ink and I did not wonder at their rejection. Bloody-nosed beetles and Oil-beetles would also probably prove equally objectionable. Larvæ of Cockchafer are eaten, but they make a disgusting mess of a cage in which they are broken up.

Although some of the *Carabidæ* such as *Carabus violaceus* have a most offensive odour, and on that account would probably be generally refused in the beetle stage, their larvæ, obtained when digging up the earth, are greedily accepted, and I found them most useful when my young Ouzels were being reared. *Pterostichus madidus*, though a hard-shelled beetle, is eaten by some of the larger birds.

The smaller Rove-beetles (*Staphylinidæ*) are, I should think, generally accepted; but it would need a strong bird to tackle the Devil's Coach-horse (*Staphylinus olens*) which always curls up its tail and opens its jaws when touched, a really terrifying attitude, and I should not expect it to be a tasty morsel.

The larvæ of Spring-back beetles (*Elateridæ*), which somewhat resemble mealworms and are generally known as wireworms, are much liked by all insectivorous birds; as of course are the true mealworms (*Tenebrio*) of the family (*Tenebrionidæ*), and the hairy larvæ of the Bacon-beetle (*Dermestes lardarius*) of the family *Dermestidæ* the perfect insect being also eaten with pleasure.

Of the four-winged flies (*Hymenoptera*) I do not think birds have any instinctive dread, for we know that, in tropical countries, many weak species build their nests, for protective purposes, close to the nests of the most virulent wasps; still the number of birds which feed upon bees and wasps is limited; although the grubs of all wasps are recognized as excellent food for rearing young birds; the Laughing Thrushes after breaking the stings against their stiff tail-feathers eat wasps with impunity, while the Bee-eaters probably crush the bodies in their bills before swallowing examples of *Hymenoptera*, but most insectivorous birds leave these insects severely alone, and this should cause our friends who make too much of mimetic resemblance to pause before they assume that a wasp-like or bee-like aspect in another insect is invariably a protection, when we who keep birds know that it is nothing of the kind; it may be some protection against a bird which is not hungry, but not against one which is pressed for food: a hungry bird investigates closely.

Ants are well-known to be excellent food, both in the pupal and perfect stage, and nests of the red ant (*Formica rufa*) common in many woods, may be removed entire in a sack for the benefit of the inhabitants of a large outdoor aviary.

Sawflies (*Tenthredinidæ*) are generally rejected by birds in all stages, although their larvæ much resemble those of Lepidopterous insects; they have, however, the front segments rather more swollen and the cocoons are tough and paper-like as a general rule.

The smaller Crustacea and Mollusca are well known to be a favourite diet with many soft-feeders, also, of course, earthworms; the latter should always be offered to all Thrush-like birds when nesting, as they are easily obtained in quantity and with very little trouble as a general rule.

X.

QUAILS.

By D. SETH-SMITH, F.Z.S.

The Quails and their allies form a group of little birds that are very attractive inmates of the aviary. They are mostly hardy, and many of them will breed quite readily in captivity providing the aviary in which they are kept possesses certain necessary features. It should be of fairly large size, or rather should cover a good sized area, though it need not be very lofty. If possible it should not be less than from thirty to forty feet square, but if twice or three times this size, so much the better. The greater part should be turfed and planted with clumps of bushes, and the grass allowed to grow to its full height during the summer. The birds should have access to a well-lighted dry shed where they can indulge in a dust bath whenever they feel so inclined.

The species of Quails and Quail-like birds are very numerous, and it is impossible here to mention them all or to go into details as to the special treatment necessary for some of the rarer kinds. Those which are most likely to be kept in captivity are the Common Quail (*Coturnix coturnix*) and its allies the Rain Quail, the Harlequin Quail, and the Australian Quail; the Chinese Quail (*Excalfactoria chinensis*); the Australian Swamp Quail (*Synoecus australis*); the Jungle Bush Quail (*Perdica asiatica*), and some of the American Quails, amongst which is the commonest and most beautiful of all as an aviary bird, the Californian Quail.

All of the foregoing are hardy, and easily kept on a simple

H. Grönvold del.

VARIED BUSTARD QUAIL
(*Turnix varia*).

diet of seed and green food, and most of them are not particularly quarrelsome. I should not be disposed, however, to keep either Bush Quails or Californian Quails with other species of the smaller ground birds, though I have not found any of the others to be particularly aggressive if kept in a large enough enclosure. The only difficulty in keeping more than one species of the same genus, say of *Coturnix* in the same aviary is that cross-breeding may occur, if say a pair of the Indian Rain Quails and a pair of African Harlequins are kept together.

Quails commence pairing about April, but do not, as a rule, go to nest until the grass is well grown. Then the cock is very busy, uttering his shrill call-note and selecting sites for the nest which he tries to persuade his mate to adopt. The site finally selected is generally under a tuft of coarse grass which is cleverly concealed by the blades being drawn down to form a dome. The number of eggs to a clutch varies with the species, but six or seven is the usual number for the smaller species, while the Californian Quail often lays considerably more. Incubation is performed by the female only, and occupies from sixteen to twenty days according to the species. Young Quails when first hatched are extremely beautiful little things, resembling miniature partridge chicks. They remain in the nest with the mother for about the first twenty-four hours, after which they follow her away into the grass.

This is a critical time for the chicks, for should there be any weakly ones they may be left behind, when they soon perish.

A plan adopted by the writer some years ago for rearing young Quails proved very successful. A run, about six feet long by four feet wide and twelve inches high was made, the sides close boarded, but the top of wire netting, one end was hinged at the top so as to allow of the Quail and her brood being driven in. Part of the top was made to open for feeding. Leafy branches were placed over part of this run, and a sheet of corrugated iron kept in readiness to be placed over in case of heavy rain. Care was taken that the run was placed on good turf in a dry situation.

Into such a run the hen Quail with her brood is driven as soon after they leave the nest as possible. Ants' nests are searched for and dug up (enough can usually be found in any

fair-size garden) and a tin of ants and their eggs kept in readiness to supply the chicks at frequent intervals. After a day or two finely chopped yolk of egg is supplied and readily taken by the chicks, which after a short time will take coarser soft food consisting of chopped egg, breadcrumbs and finely chopped chickweed. Seed, in the form of millet and Canary, must be supplied for the mother, and it is surprising how soon the chicks also will take to eating this.

A dusting bath—consisting of a heap of dry lime rubbish and sharp sand—must not be omitted from the run. About once a week it is desirable to move this run on to fresh ground, and when the young birds are about three weeks old they can be let out with their mother into the aviary again. It is desirable, however, to clip the feathers of one wing to prevent their flying up and damaging their heads against the top of the aviary. In fact most Quails in captivity are best pinioned so that it is impossible for them to fly against the aviary roof. The American Quails however are great perchers and should be left with full wings.

I know of few prettier sights than that presented by a brood of newly-hatched Chinese Quails, little larger than bumblebees, as they follow their mother through the grass, or rush to her call when she captures some tiny insect.

XI.

THE FEET OF BIRDS IN CAPTIVITY.

By KATHARINE CURREY.

Caged birds very often suffer in their feet, and, after many years of bird-keeping, I have come to the conclusion that a bird's foot can be made and kept quite sound and healthy (provided of course there is no hopeless crippledom or disease) by fulfilling two conditions—a constant supply of fresh *earth*, as well as sand and gravel, and giving the bird the opportunity of changing the position of its feet and toes.

A bird's foot needs exercise as much as a human hand. Watch the wild bird in a tree, how constantly he changes the position of his legs and feet. Now the foot is spread out; now tightly clenched round a slender twig; now relaxed as he grasps a bough; now he hangs upside down, suspended by his feet; now holds on to a bough astant, one leg drawn up, the other stretched out—always a change of position. If a bough is not placed in a cage, then the perches should be of different sizes, and some slanting, some almost upright. Further, I have often noticed that a wild bird chooses a living branch to perch on in preference to a dead one. Is it the electricity in the living bough that responds, in some way, or the electricity in the bird's foot, or is there a subtle warmth in the live wood that is agreeable to the touch? The fresh earth seems to me of almost equal importance for the feet.

Earth has a magnetic healing influence, as well for birds as for man, and I have found the effect of daily contact with fresh earth wonderful for weak or suffering feet of birds I have kept.

That and the daily bath of fresh water ; whereas the feet of birds I have kept in an aviary with a cemented floor have not been in a satisfactory state, though I kept the floor well gravelled.

An earth-floor to an aviary can be made rat-proof by a small-meshed wire netting bottom to the aviary, two or three feet below the ground. The easiest way of placing such an aviary in position is to dig out the earth to the size of it, and sink the aviary in, filling in the earth that has been dug out, up to the level of the ground. The earth can be raked over every day, and fresh earth added, and patches of grass laid in part of it, forming a happy hunting-ground for worms.

I am quite sure that the more of natural surroundings we can give the birds the healthier they will be. And we owe them this if we deprive them of freedom.

XII.

THE CROW TRIBE.

By E. G. B. MEADE-WALDO.

Members of the Crow family have been for ages, and still are, favourite pets in this country. Their vivacity, power of mimicry, and the comparative ease with which they are kept, recommending them to many who do not care for birds in general. They have the reputation of being very long-lived, and in many cases this is correct, but I do not consider that they are suitable cage-birds as a rule. All are birds of high intelligence, extremely active, and many of them are hardly ever quiet. They are best suited to roomy aviaries or semi-liberty. Under these conditions they thrive for years, and do not seem to mind confinement in the least, as they make friends with man, and amuse themselves in a variety of ways. All seem to pair for life, and are devoted couples.

The power of mimicry is by no means confined to tame individuals; both wild Jays and Magpies may be heard amusing themselves by imitating various local cries. In many places I have heard our common Jay hooting and calling exactly like the Brown Owl, whose cry has evidently, and probably with reason, impressed itself very much.

In one of our woods the favourite song of the Jays in spring (for it is in spring that all these strange cries are mostly uttered) is the call of the male common Sheldrake. No Sheldrakes have been kept there for at least ten years. Yet the cry has not been forgotten, and has probably been handed down to

the young from year to year, but I do not recollect to have heard that cry except in that particular wood.

The Crow tribe are practically omnivorous, and will not thrive on any one food; unfortunately for them they are more carnivorous in spring and early summer. The Raven appears to be the most carnivorous, but even he must have abundant variety in his diet. None of them are birds that have a feed and fill themselves; all are birds that are feeding on and off the whole day. Food is buried and dug up again, hidden in trees, covered over with clods of earth, but I don't believe that any hoard is ever forgotten. I can imagine no worse way of feeding these birds than one which is commonly adopted, viz., to give a lump of raw flesh! If flesh is given it should be either in the form of a bird or mouse, or a skull or bone, or in some cases, such as the Cissas, tropical Jays, etc., finely chopped meat mixed with other food, mealworms, etc. Eggs, so popular in a wild state, do not seem to be much relished in captivity, at any rate by some species, and I have given Starlings, Blackbirds and Thrushes eggs, day after day, to Choughs, Azure-winged Magpies (*Cyanopica looki*), Siberian Jays, etc., and they took little notice of them.

All the Crow tribe are very great bathers, and must be most liberally supplied with fresh water. With plenty of exercise and occupation they are hardy, but naturally require a good thoroughly sheltered house to retire into at night.

Although many species have some raucous unpleasant cries, all have some charming modulated notes. The Raven will warble like a Blackbird, and also ventriloquise, so will the Carrion Crow. The Siberian Jay* (*Perisoreus infaustus*) of which I wrote an account in the early days of the magazine, has many most musical cries. I do not recollect to have seen one of these charming birds in captivity since we had our pair, which lived for many years; these would eat mice and mealworms, but were also great consumers of currants, sultanas, etc. All the true Jays are very fond of acorns. I believe no true Jay is found where there is no oak.

* *Avic. Mag.*, 1st Series, V., p. 101 (1899).

In conclusion, I would urge that those who keep any of these birds, should confine them in roomy aviaries or keep them in semi-confinement. Remember that they like to be taken much notice of, are great bathers, are omnivorous, and they are not as a rule suitable companions for other birds. I think an exception may be made of the Choughs, but even they are best kept by themselves.

I do not think many of these birds have bred in confinement. Most of them are very shy at the breeding time. The Raven of course has bred at Lilford and repeatedly at Scampston. The Chinese Blue Magpie has bred in the Zoological Gardens and the Spanish Blue Magpie at Lilford, and the latter built most beautiful nests and laid clutches of *clear* eggs, on which they sat diligently year after year in our aviaries.

XIII.

**TOURACOUS, BOWER BIRDS, AND
BIRDS OF PARADISE.**

By Mrs. JOHNSTONE.

Touracous are, I understand, classed with the Cuckoos, on the ground principally of the likeness of each when in the nest. I fear I am *not* scientific, for, in my opinion, the Touracous are totally unlike the Cuckoos. In their movements and ways there is no resemblance—the Cuckoo is principally insectivorous, the Touracous largely frugivorous.

The Touracous stand alone for grace of movement and beauty of form of colouring; in fact, there are no other birds living, as far as I know, that resemble them. The first specimen I ever had was a young bird, hand-reared from the nest and almost bare of feathers, with the exception of flight feathers and tail. She—for she turned out to be a hen Fraser's Touracou—was absurdly and delightfully tame and in the best of health. What her age was I could only conjecture, but now on looking back and comparing the ways of her baby son I should say she was about six months old.

I remember she filled me with amazement by the way she bolted large pieces of cuttle fish, she had evidently been denied grit or lime in any form. Later I was able to secure a mate for this bird, and the pair were installed in one of my aviary divisions, about twelve feet square with a larger outside flight beyond.

I cannot speak too highly of Touracous as aviary birds. I consider they take the first place, both for beauty, hardiness,

and great intelligence. I may have been fortunate in my particular pair, but a pair of another variety I possessed were equally charming. They are easily kept on banana—it must be ripe, given *whole*, with a small strip of the skin peeled off—this will be entirely cleared out and the fruit keeps so much fresher than when cut up. A bunch of *sweet*, sweet-water grapes (these can be *very* sour) are also much liked, and elderberries, hawthorn berries and blackberries are much appreciated, also a lettuce, placed in a pan of water to keep it fresh. A few mealworms given daily are good, but at the best these are indigestible things. Silkworm eggs allowed to hatch, and the worm given when about an inch long, is worth a dozen mealworms and really not much more trouble. My tame hen was very fond of an earth worm, and it was a curious sight to see her dispose of a really large, strong worm. *Nothing* can wriggle like a worm, unless it is an eel, and yet the Touracon would walk slowly round it and catch one end and in a few quick gulps it was gone. It was amazing that this extremely lively creature did not upset her, or at least cause inconvenience, but she would spring lightly to her perch, cleanse her beak, and commence to caw or scold in her usual conversational manner.

When these birds commenced to nest, which they did early in May, the cock was very fierce, and the bird boy fed them in fear and trembling every morning. This delightful impudence was one of their most charming traits and they were a constant source of amusement to all.

Several young were hatched during the season, but only one reared to maturity, and this bird lived for two years in my aviary. He never was quite as tame as his parents, a curious fact, as I hoped he would be equally tame. Touracous love bathing, and, if given a shallow pan of tepid water, thoroughly enjoy themselves. They require plenty of room, as the flight is so beautiful, the carmine flight feathers only show when the wing is outspread, and a Touracou in a small division is absolutely wasted.

The sexes are not easy to distinguish; at any rate I should be puzzled if asked to sex a single bird, but with a pair together it is easy to distinguish them, as the hen is much more feminine-

looking, and is less fierce and more easily tamed. I think, too, the bill in the hen is smaller.

For *their* patience in fully rearing a young bird to maturity I was awarded a silver medal by the Avicultural Society. A proud moment and a memorial of these charming birds, which I much value. A full account of the nesting appears in Ser. 2, Vol. III. of the *Avic. Mag.*, page 25.

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The Bower Birds, of which I have kept several, are also interesting to keep, but much less easily tamed than the Toura-cous. In fact, I can say truthfully, I never succeeded in *taming* my birds at all. Probably they live entirely in the thickest of dense undergrowth and rarely appear in the open, unless to make and decorate their bower.

They are singularly shy birds, highly nervous, and to be kept with any degree of pleasure, both to the owner and bird, must have plenty of cover in which to hide and shelter. My birds were fully adult when imported, I mean by this fully grown, but not in the blue-black plumage an old cock assumes. If imported young, they might be more easily tamed, but mine were as wild as Hawks and always remained so.

I kept my five birds (*Ptilonorhynchus violaceus*) in a large aviary, about 15 ft. square, during the winter; and in the summer they had an additional outside aviary, in which were growing tall Rhododendrons, small shrubs and bracken, in fact a small piece of woodland wired in. They made a beautiful bower between two Rhododendron bushes, and decorated it with broken china (blue they preferred), sea shells, and any scraps they could find. About April, they built a rough nest of twigs, high up in a tall Rhododendron, and two young were hatched, but alas! as soon as they flew a bitterly cold night killed them. The young were remarkably thinly feathered and the June frost was too much for them. (*Avic. Mag.*, N.S., Vol. I., p. 64.)

That these birds are highly intelligent there is no doubt; the grief of the poor mother I shall never forget, and she quite forgot her fear of humans in the search for her dead babies. A good insectivorous mixture, with banana or sweet water grape

H. Grünvold del.

THE REGENT BIRD
(*Serriolus melinus*).

are all these birds require, but the young were reared entirely on live insects, mealworms and cockroaches.

I have also kept, for a short time only, three specimens (either hens or immature cocks) of the beautiful Gardener Bower Bird (*Amblyornis subalaris*). They are hopelessly wild, in spite of every protection in the shape of thick fir boughs. I cannot say I felt any desire to keep them, as it is somewhat irritating after weeks of quiet and care to find no improvement, and only the same wild terror on your approach. These birds ultimately met their death from this cause, and died from an injury caused by hurling themselves against the wire divisions—too highly nervous to submit to the dignity of captivity, they are best left to their native wilds and freedom.

* * * *

And now I come to the most wonderful of all birds—the Birds of Paradise.

Altogether I have had in my possession twelve different species of this superb family. Some I have only kept a short time, others have been years in my possession, but all are interesting and beautiful.

Those I am most familiar with are *P. raggiana*, the King Birds of Paradise, Hunstein's Magnificent, the Six Plumed Bird of Paradise and the Magnificent Rifle Bird. All these are hardy, with the exception of the King Birds, and these seem to me to need something we cannot give them. Personally, I believe they cannot stand damp and the quick changes of temperature for which our climate is famous, and for this reason would do much better in an *indoor* aviary, only they are very energetic birds and would quickly get fat if denied the possibility of exercise and given liberally too fattening food. All my Paradise Birds flew almost daily out of doors, summer and winter, and I do not think they mind a low temperature if they can move about freely.

They can all be fed on fruit and insectivorous food. To the latter I added a little chopped, well-boiled sheep's head, which they all liked and which I believe is very good for them. Apples they are particularly fond of; this was curiously proved when, late in the autumn, a hen Rifle Bird escaped from my

aviary and was in the surrounding woods for many weeks. A neighbour—proud of his Ribston Pippins—was much, and very naturally, annoyed to find every morning several empty “shells” of apple skin on the ground. So curious was the way the apples were eaten, leaving quite three parts of the skin intact, that I felt sure my lost Rifle Bird was the culprit, a fact which was afterwards proved by her recapture when all edibles, such as apples and blackberries were over. When re-captured she was thin but perfectly healthy, and is now a member of the lovely collection at the Zoological Gardens.

As a family, they are undoubtedly very intelligent, an important point in an aviary bird. They get tame quickly, and several in my collection would take a grape or mealworm from my fingers.

Hunstein's Magnificent (*Diphylloides hunsteini*) is, or appears to be, the least intelligent. In the hen plumage these birds are bright and quick in their movements, but as soon as they assume adult plumage they become lethargic. A cock will sit absolutely still for as long as you can stand or watch, with his green breast plate spread out and his beak pointing upwards. Amongst green foliage he would be absolutely invisible in this position, and it is a wonderful instinct which makes him assume it when humans are present. When these birds fly, the rustle of the wings is an interesting point I have never heard explained. It is like the loud rustle of silk and it is difficult to believe the wings make it alone. I think in the Rifle Bird it is the most noticeable.

The *Apoda* and *Raggiana* are very fond of mice, and woe betide one if it enters their aviary. The business-like way in which the poor captive is held firmly under the foot, each tiny limb broken by the powerful beak of its captor, shows it is not a chance appetite, but one that is natural to the bird in its native land.

Each different species has its own peculiar display, all somewhat ridiculous and yet very wonderful. Every gorgeous feather is made the most of for the attraction of the hen bird, who, I have often noticed, remains singularly unaffected and receives all the adoration in a phlegmatic and unappreciative manner. One hen King Bird invariably flew down to feed at

the moment, when the cock, a living jewel, was prancing and dancing for her edification.

How many of these beautiful birds remain alive in England I do not know. Mr. Brook's collection at Hoddam Castle is a marvellous sight, and, undoubtedly, the finest collection of Paradise Birds in the world. Mine, alas! are only a memory, as much illness in my house, which included the birds' keeper, necessitated my parting with all.

XIV.

HOW TO BREED BIRDS.

By J. LEWIS BONHOTE.

At this time of the year the thoughts of all aviculturists are concentrated on "spring-cleaning" and the re-arrangement of their stock into their summer quarters, whether for breeding or otherwise. On looking through the back numbers of our Magazine one is struck by the fact that, amongst all our members, a comparatively very small proportion can in any way be termed successful breeders; of course the difficulties to be contended with are great, the majority of the birds kept are inhabitants of foreign and more genial climes, then natural food, and especially that with which the young should be nourished is unattainable in this country, and from lack of aviary room they cannot be given the quiet and freedom from molestation necessary to the successful rearing of their young. In spite of all these drawbacks, however, the list of successful breeders might be much greater than it really is, and I propose to give a few hints which may, I hope, assist in producing a greater measure of success. Two factors are indispensable to successful breeding (i) Condition, (ii) Stimuli, which, in other words, implies environment and attention to minute details.

Firstly, Condition. This is, of course, a *sine quâ non*, and unless it be in suitable 'condition' no bird can breed or should even be mated up for breeding. A secondary point to be borne in mind about 'condition' is the time of year at which a bird must be brought into breeding trim. In this respect many birds in confinement are late—not till June or July do they respond to

the influences (often the reverse of genial) of our Spring, and by July the year has turned, the moult commences and the opportunity of nesting for that year is lost. Of course we know that many broods are successfully reared in the latter part of the summer, but we are endeavouring to show that the measure of success might have been much greater had the stock come into 'condition' sooner. Those species that never breed owing to this cause largely outnumber those that do. Our first efforts, therefore, should be to get our stock into breeding condition as soon as possible, let us say by the end of April, and for this purpose at least two or three months preparation is necessary.

First of all, the sexes should be kept apart, where they can neither see nor hear each other. They should be kept in an aviary with inside and outside flight, in which they should be allowed to fly on fine and warm days; the inner aviary should, however, always be warm (not hot) especially at nights. They should not be allowed in the outer flight till towards mid-day, and shut up again before sunset. Actual cold, provided the weather be fine, will do them no harm for their few hours flight, but on raw days, especially if accompanied by rain and wind, they should only be allowed out for a very short time or not at all. The next important consideration is food: this should be abundant and nourishing, but of not too fatty a nature, as a fat bird will never breed; fresh green food, bath, grit, and other hygienic adjuncts should be carefully attended to, and the result of such a treatment, if conscientiously followed, will not fail to bring the birds into 'condition.' It is of course much easier to write about these matters than to carry them out successfully, the main stumbling block being the question of food, and as this article is not on any particular species it is impracticable to give any special menu.

The main facts to be aimed at, however, are fresh air, exercise, moderate warmth, good, but not fattening, food. I need hardly state here the signs of a bird being in good condition. Glossiness of plumage, brightness of eye, alertness, quarrelsomeness, restlessness, song, or frequent repetition of a call note, full development of any ornamental plumage, etc.; these are signs of 'condition,' and until a bird shows them no attempt should be made to bring the sexes together.

The mistake is often made of pairing the birds too soon, a procedure which defeats its own object. The male is usually ready before the female, and if they be paired as soon as the male is in 'condition' he exhausts himself in trying to persuade his mate to take on duties for which she has no inclination, and she, worried with his attentions, loses 'condition' rather than gains it.

We will now suppose that by the beginning of April both sexes are ready to breed, or nearly so, we still need not hurry, the longer the sexes are kept apart the more easily they will pair, and the middle of April is quite early enough to bring them together.

We must now turn to the important question of pairing and the second of our great factors '*stimuli*.'

If possible the hens should have been kept in the aviary in which they are to breed, and if, as often happens, it is necessary to have two or more species breeding in the same aviary, the hens should have been kept together during the early months of the year. If, however, it has not been practicable to keep the hens in their breeding quarters during the few months immediately preceding the nesting season they should have been moved into their nesting quarters at least a fortnight previous to the introduction of the males.

The number of hens kept should always be greater than the number of males, as they are more difficult to get into 'condition,' and since they play the chief part in the choosing of their mates there is more chance of any particular cock finding his 'affinity' if there are several hens on the look out for an 'eligible bachelor.' Animals and birds will generally mate up, even if they are not particularly attached to each other, if there be only one pair, but success is much more probable if they are allowed to choose their own mates. These small details may seem rather trivial, but it must be remembered that these notes are meant to apply chiefly to those species which seldom breed in confinement; with those that nest freely these methods are unnecessary, though, even in the case of free breeders, these hints would not be found useless.

We will now presume that our birds are in 'condition' and the hens in their breeding aviary, the next move is to introduce

the males. One or two moderate-sized cages should previously have been placed in the aviary, and, when the hens have got accustomed to these cages, the males should be put in, each one in a separate cage. All the males that are intended to breed in the aviary should be paired at the same time, and it will conduce to future peace if these males have already been living together. The best time to cage up the males is after dark or just before dusk. Owing to the birds taking fright and knocking themselves about it is often impossible to move them after dark, and it should then be done just before they go to roost; the main idea, however, is that they should remain quiet when first moved and wake up in their new quarters, by this means they will be far less disturbed by their change and no violent fighting is likely to take place. On the evening of the second or third day the doors should be opened and the birds allowed to find their way into the aviary in the morning.

If these instructions have been followed out there is not likely to be any serious trouble, but the aviary should be watched for the next day or two. The next step will be to remove the surplus hens, and this can be done as soon as it is seen which pairs have mated. This may take place almost immediately, or not for some days, but if the birds are really in condition it will not be long, and once that has been successfully accomplished the first step is completed.

Our attention must now be concentrated on the second great factor, that of *stimuli*, for a bird in breeding condition and mated will not necessarily breed, or at the most will only drop her eggs if the surroundings are not to her liking, and, in the case of some species, they will not even mate until they see the materials and locality for their future home at hand.

The first important point to consider under the head of 'stimuli' is the other inhabitants of the aviary. The ideal conditions is of course to give each pair an aviary to themselves, but when space does not admit of this arrangement a golden rule to remember is to place in the same aviary species which are *least* nearly related. During the nesting season—except in the case of those species which breed in colonies—a bird is always most pugnacious towards its own kind, or those of other nearly related species.

The size of the aviary is not so important an item as many seem to think ; and, personally, I believe that more success is likely to be attained by keeping a pair to itself in a large cage than in an aviary with other birds ; a fact I have proved to my own satisfaction over and over again, but if birds are to breed in a cage they must of course be in tip-top condition. The reason for this is fairly obvious : in an aviary they have so many outlets for their energy in flying about, fighting and searching for a suitable site, that much of the vigour that should be expended in breeding becomes dissipated in other directions, besides which the smaller (within limits) the cage or aviary the easier it becomes to give each bird individual attention and keep up his condition.

The next important point is quiet or seclusion. Many species will not nest unless they feel secure from their enemies, and, consequently, before the nesting season the breeding quarters should be thoroughly overhauled, and all mice, rats and especially cats, should be kept well away. There is nothing more disturbing to birds than the nightly patrolling of their premises by cats, and this of itself is quite sufficient to prevent many species from attempting to nest.

We must now consider the furnishing of the aviary, and as a preliminary should read up as much as possible of the birds' habits when wild and try to imitate them fairly closely. In most cases of course an exact replica is impossible, and, therefore, more success is likely to be obtained by studying the essentials rather than the details. For instance, with species that nest high up in trees the essential point is that the nest is placed well away from the ground, and a nest-box attached to the roof of the aviary is more likely to be appreciated than one lower down or on a tree. A Kingfisher that breeds in a hole in a bank overhanging water would take equally readily to a box on the wall provided it went in far enough from the entrance—the water would not be essential. Each nesting-place should be arranged so that it may be easily defended, and there should be very few perches near it, only just sufficient in fact for the needs of the nesting pair, for if other birds are able to settle near the nest it will probably be deserted or the young destroyed. For those species which nest

in thickets, several small thickets suspended if possible from the roof will be found more acceptable than one large one. In any case, far more nesting-sites should be provided than the number of pairs, and, further, the birds should be carefully watched so that if they appear to have decided on a spot unsuitable or unprovided with the necessary accommodation a nesting-site may then be fixed up in that spot. With those species that build open nests in bushes, several flat platforms of natural twigs may be fastened here and there, which may be used as a foundation. Nesting material of all kinds should be abundantly supplied, as well as plenty of that most artificial of substances cotton wool, for many species are very fond of this as it forms such excellent binding material and is at the same time soft and warm.

I cannot, in this very general article, enter on the question of food. The staple diet should of course be that which they have been having in order to bring them into 'condition,' but the nesting of backward or shy breeders may sometimes be brought about by giving them, in addition to this, the extra food which they will eventually require to rear the young; this need not of course be continued after they have commenced incubation, but in some cases it does undoubtedly induce them to make a start.

This, then, completes the rough summary of essentials mostly consisting of small details which, undoubtedly, go a long way towards bringing about success.

There is, however, one more point which may be mentioned, and that is the conduct of the aviculturist himself towards his charges. In breeding rare species, our object as aviculturists should be to add something to the general knowledge of the inner life history and habits of our pets. Many, and perhaps most, bird-keepers are so anxious to rear the young that they make few or no notes about them, and are content if at the end of the season they have doubled or trebled the number of any particular species, a result which might often be more easily obtained at less expense and trouble by a letter to some bird-dealer. Yet opportunities of studying duration of incubation, down plumage, methods of feeding have been allowed to slip by unnoticed. Personally, I have found that birds will not resent an inspec-

tion of their domestic affairs if done judiciously and by the right person. Strangers should, of course, never be allowed in the aviaries during the breeding season, and the fewer people that are taken to see the birds at that time, even outside the aviaries, the better. Birds, however, soon get to know their keepers provided they are usually dressed in much the same manner and take but little notice of them. Any inspection of the nests, etc. should be done as far as possible from the outside, and when nests are actually visited it should always be in broad daylight and if possible when the parents are off feeding. Close observation will soon give a hint as to when the birds are laying, and one or two visits will be sufficient to establish the exact date of the laying of the first few eggs, they may then be left entirely alone till they are nearly due to hatch, the exact date of which can then be usually determined by further close observation and one or two more visits and a note of the down plumage may be made at the same time. During the first week or so, after the young are hatched, they may generally be visited with impunity, and notes made on the early growth of the feathers, and, at the same time, one can see that they are being well and suitably fed; during the latter stages of feathering they should be left alone as otherwise they are certain to leave the nest too soon.

Such, then, are a few hints, which if followed should certainly increase the chances of success. The true bird-lover who knows and studies his charges will, of course, realise that these broad notes must be modified and adapted to suit the individual idiosyncrasies of every bird, for the lower animals have a great amount of individuality which is too often ignored by their keepers. Some of my readers may think the suggestions put forward trivial in many cases and involving a good deal of trouble; they have all, however, been founded on study, thought and experience, and what can be obtained without trouble is usually not worth obtaining. Of course, we cannot guarantee success, but those who follow these instructions will at all events deserve it, and even if they fail they will, if they be true bird-lovers, be practically recompensed by the interest awakened and knowledge gained from a closer study of their pets.

XV.

L A R K S.

By Dr. A. G. BUTLER.

Our Editor has asked me to contribute an article upon these birds although my experience of them is limited to three species:—the Skylark, Woodlark, and Mongolian Lark, other more competent members of our Society not having been willing to help him. He says:—"to have kept one species and studied it is better than to have had fifty and just fed them in a cage." Of course this is true, and, therefore, I am doing what I can towards helping those with even less experience.

The Larks are related to the Finches and Pipits but differ from all their relatives in having the back of the tarsus scaled as well as the front. The form of the bill in the various genera differs to an extraordinary degree, being slender, as that of a Warbler in some; long and tapering with a slight terminal curve (so as almost to recal the Hoopoes) in *Certhilauda*; broad, short and notched like that of some Buntings in others. Unlike the Finches, the bills of Larks do not seem to afford good sexual distinctions, but as a general rule the males may be distinguished from the females by their superior size, broader chests and noticeably longer wings (see my little book "How to sex Cage-Birds," p. 92); the hind claw is also said to be longer in the males than in the females, but I have hitherto had no opportunity of confirming the statement.

Being related to the Finches and Pipits, the Larks naturally feed both upon seeds and insects, and therefore should have both in captivity. A good insectivorous mixture, a tea-spoonful

of canary-seed and two or three mealworms, smooth caterpillars, or spiders daily, constitute the most suitable diet for caged Larks; a fresh clovery turf, a little groundsel, chickweed, or chopped lettuce should also be given when obtainable.

As these birds do not wash, but dust themselves after the manner of fowls, they should have abundance of fine fresh sand, in which to perform their cleansing operations. Being subject in their natural state to showers, it does not hurt them to occasionally sprinkle them with a fine syringe; but as they are unable, unless kept in a spacious aviary, to get sufficient exercise to dry them rapidly and restore them to their normal temperature, it is not advisable to overdo that sort of thing; and the safer plan, in my opinion, is to abstain from the practice altogether.

Unless you possess both sexes of a species and desire to breed from them, Larks are far better kept in cages than aviaries; in the former they not only sing much more frequently, but they can be better attended to. The cage should not, as a rule, be lofty; and, for recently acquired birds, which are nervous and liable to spring recklessly upwards at the risk of concussion or a broken skull, the roof should be of canvas; for well-established birds however this is unnecessary, and then it may either be of wire or wicker-work, the latter being preferable. For the common Skylark I found the ordinary runner-cage, two feet in length, about seven inches in width and nine in height, with a central door, most suitable: I used to turf one end, thickly sand the other, hang food and water on the front and put a small pan of canary-seed inside.

The Chinese cage for thick-billed Larks is circular with a central one-legged table upon which the bird mounts to sing: the only objection to this cage is that it is not large enough to give the inmate much exercise: I therefore got the late Mr. Abrahams to have a special cage constructed for my Mongolian Lark; it was of the waggon pattern, with overarched willow bars and a sufficient depth of wood to enable me to cover the floor with abundance of sand; the back and ends were of wood and the length of the cage two feet: a movable slip in front admitted a scraper for cleansing the floor, and the sand was poured in through the top bars: food and water pans slid in from the front

at either end just above the sand: this bird lived in perfect health to a good age.

Larks roost at night upon the ground, so that whether in cage or aviary they should not be subjected to possible attacks by either rats or old buck mice (the latter are often equally dangerous). Rat or mouse-virus, when it can be obtained in good condition, is most effective; but I am afraid, now that it has made a name for itself, it is by no means so satisfactory as when first placed upon the market: in 1911 I sent for two tubes of mouse virus and a phial of Rattine and although I carefully prepared them according to instructions, not a mouse was destroyed by any of them: in 1910 one tube of mouse-virus cleared off every mouse on my premises.

Unlike most birds, Larks appear to sing instinctively: that is to say, instead of learning from their parents, the wild song appears to be hereditary. I have taken Skylarks from the nest when six days old and hand-reared them, and one of these, though a hen, sang the well-known song of its species; others taken when fairly well feathered not only produced their own natural song, but introduced into the performance parts of the songs of other birds in my possession.

My first attempts at handrearing Larks were not successful, the whole of them having died from cramp, although kept warm in a basket of hay and covered with flannel at night. Considering that in their wild state birds would be crouching together in a nest placed in a hollow or depression in the earth, I concluded that moist warmth to the legs was necessary in their infant stage; I therefore cut a hole in a thick turf and inserted therein a Whitethroat's nest, in which I placed my nestling Larks, covering them with a piece of flannel to represent the mother-bird: from that time forward I had no further difficulty in rearing Skylarks.

I have had no experience in breeding Larks, and for that reason I should have been better pleased if our friend, Mr. Reginald Phillipps, would have consented to undertake this article. I should imagine that, at first, these birds would require a considerable amount of living insect-food for their young; a point upon which, I think, Mr. Phillipps, does not speak defin-

itely in his account of the nesting of the Black Lark. Soiled hay seems to have been preferred for the nest; not I should imagine to render the latter less conspicuous, but because it would be easier to mould than when fresh and stiff.

Many years experience in bird-nesting convinced me that birds selected such suitable materials as were nearest to hand, without considering whether the use of these would render their homes conspicuous or the reverse: the only Chaffinch nest which I ever found completely covered outside with grey-white lichen was placed in an elm-hedge skirting a wood and was so glaringly conspicuous that no passer by could possibly fail to notice it: the lichen had been obtained from a tree a few feet behind in the wood. This is not an isolated instance; the nest of the Long-tailed Tit is frequently a prominent object in a roadside hedge, and consequently tempts the young clodhopper to exhibit his destructive instincts.

In the foregoing observations I have dealt chiefly with those Larks which spend a considerable part of their existence upon the earth or near it, but there are others, such as the Wood-lark, which often settle upon the tops of hedges or the branches of trees, and for these it is necessary to provide loftier cages supplied with perches for their use during the daytime: at night, like other larks they rest upon the ground. Even a Skylark can settle upon a branch, and one which I kept in an aviary frequently did so, but it looks awkward in that position with its long hind claw pointing straight downwards.

XVI.

BULBULS.

By Dr. A. G. BUTLER.

Although I have only had the pleasure of studying four, or if we include the Spotted-wing (which certainly is an aberrant Bulbul), five species of this delightful group of birds, I think perhaps my experience in keeping them may not be valueless.

The Bulbuls (*Pycnonotinæ*) or Eastern Nightingales belong to the so-called Babbling-Thrushes, and, on account of their short legs, they have been placed in a family to which the name *Brachypodidæ* was given. In their strong hard bills and general appearance they are rather Tit-like in character and the resemblance of the Indian form of *Pycnonotus leucotis* to *Parus major* is quite as great as between many mimics among birds, the crest of the Bulbul being the most obvious difference between the two.

As captive birds the *Pycnonotinæ* are extremely fascinating, being naturally hardy, easy to provide for, generally of a confiding nature, always musical, and in the case of the Persian form of *P. leucotis* noted for melodious song, and I should judge, provided that true sexes are secured, by no means difficult to induce to breed in an aviary; the behaviour of my Red-vented Bulbul in trying to assume parental duties towards a nest of young Blue-birds would seem to justify this conclusion.

Although Dr. Sharpe, in his Catalogue of Timeliine birds, records no differences between the sexes of the Bulbuls beyond size (and even then only in some of the species), although also he frequently asserts that there is no difference in plumage, I must confess that when one compares undoubted sexes of some

of the species side by side, the difference in colouring seems to me sufficiently marked to make one wonder how it could fail to be noted : but, apart from colouring, the outline of the bill in the two sexes differs so markedly, that the would-be breeder ought to have no difficulty in selecting sexes.

In choosing a pair the aviculturist should select as male the larger bird with short robust bill, its culmen well arched, that of the female being longer, more slender and with the culmen only slightly arched ; the tone of the brown colouring usually differs somewhat, and when the under tail-coverts are rosy, the male has that colouring better defined, brighter and covering a larger area ; I cannot say whether a similar difference obtains in the yellow-vented species as I have not possessed females for comparison.

The nests of Bulbuls are cup-shaped and usually are built in bushes, creepers, low branches of trees or even upon stumps ; an aviary well furnished with foliage of various kinds would therefore be most suitable for breeding purposes : although the adults feed largely on fruit and, as compared with many insectivorous birds, somewhat sparingly upon insects, it is probable that the young in their early life would be fed upon insects alone and chiefly insects in the larval stage.

If Bulbuls are desired only for song, I should certainly recommend the Persian form of the White-eared Bulbul, which is deservedly noted in prose and poetry as a grand songster : some of its water-bubble notes remind one strongly of the European Nightingale (*Daulius luscinia*) : the somewhat smaller N.W. Indian form of the species is said not to sing anything like so well, but as I have only kept the Persian bird, I cannot speak authoritatively on this point ; touching its smaller size, however, I was convinced by the late Mr. Abrahams, who sent me a body of the Indian bird for comparison with my living example ; indeed the difference was so palpable, that I wondered at the observation of the late Mr. Blanford that the Persian bird " may perhaps run a little longer."

If kept in a cage the latter should be of a size large enough to enable the bird both to use its wings freely and bathe at will. Bulbuls are by nature tolerably active birds and they delight in

a bath; they are when healthy scrupulously clean, and their plumage, though soft in texture, is kept beautifully unsoiled: with my Persian bird I made the mistake of confining it in too small a cage, the latter was of the box variety one foot across the front, 18 inches high and 18 inches from front to back, with one perch high up towards the back, and a second low down towards the front: in a larger cage and with a greater amount of fruit to eat I feel sure I should have been able to keep it for more than five years, although perhaps it might have been less confiding than it was. I have had my first male Chinese Bulbul for close upon thirteen years already and it is still vigorous.

And this brings me to the question of food:—as a staple any good insectivorous food mixed with breadcrumbs and moistened is suitable, but Bulbuls are very fond of sweets and sponge-cake either dry or moistened, or Madeira cake delights them greatly, candied fruit also and especially apricot, gives them great pleasure. They ought to have plenty of fresh ripe fruit in variety—banana, sweet ripe pear or apple, orange or ripe fig and grapes, although they seem to care less for these than many other insectivorous birds do and sometimes leave them untouched.

Insects are usually acceptable but especially smooth caterpillars, mealworms are also eaten with pleasure, but spiders alone are able to arouse enthusiasm in these birds, sometimes stimulating them to a song of rejoicing. Although most insects are eaten with satisfaction (cockroaches are almost invariably ignored), I do not find them a necessary item in the food for adult Bulbuls; they will keep in perfect health for months together without them. Of course if a Bulbul gets in the least out of sorts, a few spiders will generally set it right in a day or two.

These birds are very pugnacious; indeed, as Jerdon tells us, the Madras Bulbul is kept for fighting by the natives in the Carnatic, and he says:—"They fight sometimes with great spirit, often, I am assured, seizing their antagonist by the red feathers, and endeavouring to pull them out." In 1904, our late Editor Mr. Seth-Smith gave me a second example of the Chinese Bulbul, which, from its stouter build and duller colouring, we thought might be a hen; I turned it into the flight-cage with my cock bird and the latter at once attacked it furiously, so that

I was obliged to separate them immediately: both proved to be cock birds and used to sing one against the other until I gave the plumper bird away.

Whether Bulbuls would be dangerous associates for smaller birds in an aviary I cannot say, but they are no match for such birds as Hanguets, which pursue and attack them to their hurt. In a large aviary, planted with trees shrubs and creepers, I should expect them to behave peaceably towards all excepting birds of their own kind, still it would be wiser to test them first with a few small and common species before running the risk of having valuable birds killed.

XVII.

WADERS.

By C. BARNBY SMITH.

Those small marsh or sea shore birds popularly known as "Waders" are, I think, very interesting in many respects, but in this beyond all, that they, with a little difficulty, may have their enclosure so arranged as to make a pleasing little picture in the garden—a thing that cannot be done with many other kinds of birds. Water, of course, is a necessity, but this need not be in great volume if it is kept fresh. My own arrangement as regards water for my small Waders' aviary is a little pond formed by a concrete bed about 5 yards by 3 yards edged with brick cemented walls about 3 feet high, the top of the walls being below ground level. The bottom of this little pond I covered with earth and sods to an average depth of about $1\frac{1}{2}$ feet, sloped the earth outside the pond in banks down to the top of the walls, covered the top of the walls with sods of coarse growing grass, planted rushes, flags, and semi-aquatic vegetation in and around the pond (making one miniature island in addition), with the result that the fact that the pond is artificially constructed is by no means apparent. The water is supplied by pipe just above the level of the walls, and as the adjoining soil is gravel and sand I merely turn on a tap outside the aviary for a short time every few days and let the pond overflow and the surplus water drain away into the surrounding soil.

Near the pond are a few square yards of sand, which is kept fresh by raking and a fresh sprinkling of sand given weekly. In one corner of the aviary is a little shelter shed open on two

sides and with a couple of rhododendron bushes in front so that it is hardly seen. In another corner near the water level is a small area of mud, in which the birds like to dig. Outside the aviary on two sides are privet hedges to afford shelter from rough winds and the other two sides are pretty well sheltered by distant bushes.

All Waders like to have a great deal of sunshine, and a South aspect is most desirable. Both in winter and summer the birds may be constantly seen basking in the sunshine after feeding. The aviary should be of $\frac{3}{4}$ -inch mesh wire netting let into the ground one foot and turned horizontally outwards at this depth for another foot so as to keep out rats. The supports for the netting should be of iron tubes so arranged as to be as little visible as possible. A few creepers up the iron supports help to conceal them. It is also a good plan to plant several clumps of tall growing iris, ribbon grass, etc., close to the wire netting both inside and outside. This helps to hide the netting and gives a pleasing effect.

As to Waders themselves, the great difficulty is to "get them started." They usually arrive from netmen or dealers in poor condition—sometimes frightfully thin—and with feathers all dirty through lack of access to water. Even if half-dead, the birds will attempt to wash themselves, and as the feathers usually under these circumstances fail to turn water the birds will look "like drowned rats" every time they get wet and die in a week or two, sometimes sooner. Then there is the question of getting fresh caught birds to take artificial food. My plan is to put such birds, in the first instance, by themselves in a covered enclosure protected from wind and rain and only let them bathe for a short time once a day at first. The water is taken away if necessary. I feed them on worms and maggots for the first few days, then mix chopped worms and maggots amongst the artificial food so that the birds get use to the latter gradually, and in the course of a week or so are ready to turn out into the Waders aviary with old established birds.

As to food for small Waders when established, I give in the morning bread and milk with small pieces of raw meat amongst it. In the afternoon the food is Victoria poultry meal

with shrimps softened in boiling water and *chopped small*, or mussels according to season. I also have some dari or millet thrown down on the sand, and some birds (especially Knots) are very fond of this. Boiled rice is also very good. My Whimbrel, glossy Ibis, and some Rails, which live in another enclosure, have for years kept in splendid health on an exclusive diet of boiled rice and raw meat mixed. It is good to keep fresh water shrimps, water snails, etc., in water to which small Waders have access, as even if the birds only get a few of these the constant search to which they are tempted is good for their health. Indeed, there is very soon a material difference in health between those birds who are constantly employed searching for food and those that have no incentive to do this.

A great trouble with newly-caught Waders is to get them to moult properly. Good general health, of course, induces this, but I am satisfied that hot sun and warmth are advantageous, and indeed are a material factor in the case. Some of my birds this spring have assumed better breeding plumage than ever before and I quite think this is due to the abnormally hot summer last year.

If birds arrive with clipped wings (as they often do) it is well to presently pull out the feathers that have been cut, otherwise these feathers will not moult properly. Care, however, should be taken not to pull out many feathers whilst birds are in a weak state.

As to the different kinds of birds to keep—the bird of all others for the beginner is the Arctic Knot. They are cheerful and in good feather under almost all conditions and their quaint croaking cry is a pleasant reminder of the sea shore. Next to these should come Ruffs and Reeves. The antics of the former never fail to elicit amusement from one's friends, and Reeves are very dainty and elegant little birds. Oyster-catchers are easy to keep but very nervous. Their long beaks are apt to split, and when this happens the bird must be caught and the beak carefully pared. Godwits are not difficult to keep when once established. The Black-tailed is in my opinion far more desirable than the Bar-tailed. Turnstones are not easy to obtain, but are most striking in breeding plumage, and their habit of continually

turning over stones, etc., in search of food, is very amusing. I find them quite easy to keep, fed and treated as above indicated, but cannot say the same of Ringed Plover, Dunlins and Sanderlings, which probably require more varied diet and closer attention than I can give—anyhow, they do not thrive permanently with me. I say “permanently” because it is quite easy to keep these small birds for a few weeks or months, but as they then usually get out of condition they cannot be regarded as satisfactory inmates of an aviary such as mine. Golden Plover and Grey Plover are not difficult to keep, but the Lapwing generally gets out of condition and in my opinion it is cruel to attempt to keep it in a small enclosure. The same remark does not apply to its relative the spur-winged Cayenne Plover of America, which gives me no difficulty in a small enclosure. It is, however, a very fierce bird at times. I see that a few years ago I wrote to the *Avicultural Magazine* urging the claims of the Avocet as the most charming of Waders. Wider experience (not my own only) has led me to believe that until we know more of their needs it is useless to try and keep these delightful birds. I am well aware that now and again Avocets are successfully kept, but the percentage of failure is enormous. Redshanks are more delicate than many other birds and are apt to moult badly. One of the most desirable birds for a small Waders aviary is the Allen’s rail. It is, however, apt to catch cold if allowed to roost out of doors in severe winters. The Martinique Rail is also a charming little bird, but not so elegant. The common English Water-Rail I have found quite easy to keep, and it looks quite in place sneaking between clumps of rough grass by the water’s edge. The Australian Pectoral Rail if kept with small birds should be watched closely, as it is apt to be a bully. It gives, however, no trouble in itself, and at present I have a pair nesting. Red-necked Phalaropes I have only kept a short time. I brought some from Iceland a few years ago to give to friends, whilst with me, the birds flourished on maggots and were tame beyond belief. I would strongly urge on lovers of small Waders the desirability of having red-necked Phalaropes, which are not so difficult to obtain as is sometimes supposed. Not many people have practical experience of them, but I have

known one live for two months kept in a large bedroom in a house in the North of Iceland. In the end I believe it was killed by accident. When I saw it, it was running about the floor apparently quite contented. Snipe and Woodcock give infinite trouble and are very difficult to keep in captivity. They should only be attempted by experts.

If anyone could give the space, a good way to keep Waders would be to have one large aviary for marsh birds, another large aviary for sea-shore birds (imitating natural conditions so far as possible in either case), with several smaller aviaries in which to put birds from which it was desired to breed. Where many birds are together in one aviary they usually disturb one another at nesting time. I have had, within the last four years, two Reeves' nests spoiled from this cause.

XVIII.

THE SMALLER WATERFOWL.

By D. SETH-SMITH.

A fascinating branch of aviculture which has been somewhat neglected of late years, but is now becoming rather popular where suitable conditions prevail, is the keeping and breeding of the various species of wild ducks, of which a large and varied assortment are to be had and will well repay the trouble bestowed upon them. Ducks have many excellent qualities, they are mostly very pretty, some are extremely beautiful; they are, on the whole, hardy, intelligent and peaceable, and providing they have space and suitable nesting sites, the majority will readily breed in confinement.

As to the species of ducks that are to be obtained without much difficulty, the European kinds may be first mentioned. Of the surface-feeders, Pintail can generally be obtained at a very reasonable figure, and the drake is one of the most elegant of all, but they are not by any means free breeders. Wigeon and Shovellers are also very showy and will generally breed, while Teal and Garganey are lovely little birds but shy breeders, unless they have plenty of space.

Amongst the diving ducks, the Tufted Duck is the most popular, and should never be omitted from a collection. The male is most handsome with his plumed head and pure white sides. Pochards and Scaup are almost equally attractive, and all spend most of their time in the middle of the pond constantly diving for their food which consists to a large extent of aquatic insects, crustaceans and vegetation which exists at the bottom of the pond.

MAGPIE GOOSE (*Anseranas melanoleucus*).

Photos by D. Seth-Smith.

RING-NECKED TEAL
(*Nettion torquatum*).

Amongst foreign species, the Mandarin and Carolina ducks will always be the most popular, for besides being brilliantly and beautifully coloured they are hardy and always obtainable, and the Carolina at least is a very free breeder. Japanese or Baikal Teal, formerly some of the rarest, have recently become the commonest foreign ducks on the market. The drake, when in colour, is nearly as handsome as a Mandarin. When first imported they are very wild indeed, and if turned down on a pond that is not well fenced in will probably disappear at once. But they soon become fairly tame. Other beautiful species are the Chiloe Wigeon, Bahama Ducks, Chilian Pintail, Red-crested Pochard, and several very beautiful Teal.

The Tree Ducks form a group by themselves, of which the White-faced and Fulvous are perhaps the best known. They are quite hardy and will do well if treated in the same way as the other ducks, but they are somewhat quarrelsome. I have found, however, that a pair or two kept with other ducks on a fair-sized pond will do no harm.

Regarding the conditions that are necessary for the keeping of a collection of ornamental waterfowl. If a large natural pond, fed by a stream, and surrounded with rushes and grass, is available, no more suitable place could be found, especially if it should contain an island or two, and be sheltered from the cold winds by a belt of trees or rising ground. But such situations are not always to be found, and it may be necessary to construct an artificial pond such as those in the Zoological Gardens, where, in spite of many drawbacks, a large collection of ornamental waterfowl is maintained.

Space for the ducks to roam on grass is almost as necessary as the pond itself, for many kinds of ducks are fond of grazing like Geese, and roaming in search of worms after a shower of rain. At nesting time also they like to choose their nesting places, often at considerable distance from the water. So when planning a place for waterfowl, the larger the area of ground surrounding the pond the better will the collection thrive.

If the site is much exposed to cold winds some sort of shelter should be provided in the form of rustic sheds, or shelters made of rushes tied into bundles and propped up like wheat shocks.

Rushes and other thick herbage should be encouraged for shelter and nesting sites, but some ducks prefer to nest within the shelter of a wooden box or kennel, and several of these should be provided, the ground forming the bottom, and a hole just large enough for a duck to enter forming the entrance. Quite a number of species prefer to nest in boxes or logs at some height from the ground, and so boxes should be fixed on stumps from four to six feet high, a rough log leading from the ground to the entrance.

The enemies that have to be fought against are foxes, cats, stoats, weasels and rats, and it is well worth while to go to the expense of a six-foot fence of wire-netting round the whole enclosure. To make this proof against all furred vermin it must be of small mesh, say five-eighths of an inch. It should be sunk into the ground for eighteen inches, and then turned outwards for say twelve inches, and the trench filled in and rammed. At the top of the fence also the wire should be turned outwards for two feet, that is, an extra length of wire netting two feet wide should be wired on to the top of the upright fence and supported outwards at right angles by means of iron supports screwed to the upright posts. Such a fence should be practically vermin proof.

Ducks should be fed twice a day, on a mixture of wheat and barley, and the quantity given should be just so much as will be readily consumed. The birds should be taught to come to the keeper's whistle, and when they are once accustomed to this they will readily swim towards him when feeding time comes. If they do not do so it is a sign that they are being over-fed. In cold weather, a small quantity of barley meal and chopped boiled liver or bullock's heart is very desirable, and, in fact, for the diving ducks, unless they are able to obtain a good deal of natural food, this diet should be given in small quantities pretty constantly. Bread is also an excellent diet for most ducks, and stale crusts, thrown into the water will be much appreciated.

As to the procedure in the nesting season. Experience teaches us that broods left to the parent ducks are rarely reared successfully on a large pond in a mixed collection. Many young ducks are extraordinarily independent and will go a great distance

from their parents, thus falling victims to any enemy. It is always best to take the eggs and entrust them to a reliable hen to hatch. A cross between a Silkie fowl and some breed of small bantam makes the most suitable type of hen for the purpose. The ducks' eggs should be taken any time after the laying of the whole clutch, when incubation has commenced. This stage being determined by the presence of down in the nest.

When the young ducks are hatched they should be left with the foster hen in the nest for some twenty-four hours, when they should be transferred with her to a coop, which should be set out on dry ground in a sunny position. The young ducks should not be allowed access to water for the first day or two, especially in the case of the smaller Teal, which are apt to get their down saturated with water, when they readily catch cold and die. They need very careful watching for the first week or so of their lives.

Custard or finely-chopped yolk of egg, mixed with ants' eggs and biscuit meal or stale bread crumbs forms a good food for the young ducks. Duckweed is also a necessity and should always be supplied, at first in very shallow dishes, and afterwards on a small pond.

Young ducks should not have access to the large duck pond until they are almost full-grown, but should be reared on quite small ponds to which no other ducks have access, or they will take all the food provided for the ducklings. Ducklings should be pinioned when about a week old, when the operation is such a slight one that it will cause them no inconvenience. As they grow older, soaked Canary-seed and finally wheat and barley should be given. For diving ducklings, such as Pochards and Tufted Ducks, ground bullock's heart or liver should be added to the diet after the first fortnight of their lives.

XIX.

THE GAME BIRDS.

By W. H. ST. QUINTIN.

I have been asked to contribute suggestions for keeping some of the Game Birds, founded upon my own experience, to form part of the "Practical Notes" which, for some months, have been a useful feature in our Magazine. Valuable papers have from time to time appeared in past numbers, relating to the Management and especially to the Breeding of some Families of this extensive order, notably, Mr. Seth-Smith's upon the Quails and Hemipodes, and as I do not wish to go over old ground, I will confine myself in the main either to such species as are less often kept, or in the Management of which special difficulties appear to have presented themselves.

As a preliminary, I would remark that, in the Management of Birds of this Order, much will depend upon the character of the soil upon which the birds are to be kept.

Many of the difficulties which beset the aviculturist who aspires to keep the more tender species, disappear if he is so fortunate as to possess aviaries or enclosures upon a light soil, in the composition of which sand and gravel predominate. This applies more particularly to aviaries. In these the birds necessarily 'work' the same piece of ground very intensely—Especially up and down the boundaries, whether of wire netting or other material, they are apt to make runs and paths which, if the soil be sticky, seriously affects the beauty of their plumage. It is a sad sight to see a fine Reeves or Amherst Pheasant trailing his train feathers in the mud as he fidgets up and down the fence of his run.

HEY'S ROCK-PARTRIDGE
(*Amunoperdix heyi*).

When I was experimenting with Partridges, with a view of getting them to lay in pens (for sporting purposes) on a system elaborated on a shooting in Central France, I found that one feature was that the pens should be circular, with no angle, and with the bushes or other cover in the centre and open space all round. This tended to check this habit of restlessly running up and down, turning always at the same spot, a very important point if the captive be a long-tailed pheasant, who often treads upon his own tail as he turns at a right-angled corner.

If I were ever to keep pheasants in aviaries or small pens I should certainly make the fence of the runs, where the birds chiefly take their exercise, round, or half-moon shape. Their plumage would certainly last much better, and the extra trouble involved would be well repaid, especially where the soil was strong.

But to keep some game-birds in health, not only is a light soil desirable, but ample space is absolutely essential. Capercaillies, for instance, and to a lesser degree, Blackgame, must have abundance of room. They want plenty of clean ground to range over, with dense cover at hand to which they can retire, so as to feel absolutely safe.

I think an adult wild-caught Capercaillie is about the most difficult subject to deal with that I have encountered. He will not stand close confinement at all, and must as soon as possible be enlarged. The difficulty then is to prevent his being starved in the midst of plenty, for it is of no use to put food down where he dare not venture to get it. Hand-reared Capercaillies are seldom to be had, and it may be taken for granted that a wild-caught bird will not for a considerable time ever leave the thick cover, of which there must be plenty, for many yards.

The grain (oats, peas, wheat, barley and a little maize) must be thrown down with the grit along the outside of the bushes, the pine branches stuck into the ground and the water-pens replenished, then the feeder should slip away and the birds must be left absolutely quiet. It is of course a great thing if some tame birds are already in the enclosure, as they will inspire confidence in the new comer. I found it useful to fit up a "hide" into which one could get, so that one could judge how

the birds were going on, but the screen must be a good one, and one must never be detected in it, or when leaving. In time Capercaillies will tame, and are always most interesting; but a particularly fine old cock was here almost three years before he would come out into the open to feed in our presence. It was a fine sight then to see him in the spring slowly walking round his hens, at feeding time, with tail spread and wings lowered and neck-frill standing out stiff. My Capercaillies and Blackcocks called freely in the spring, but I never saw anything that might be called a "Lek" in any special place; perhaps because the birds were pinioned and the number of hen birds small. Although my enclosure is roomy (nearly four acres) I could not keep more than one, or at the most two, Capercaillie cocks, owing to their pugnacity. Blackgame are not quite so shy and do not require so much space. But neither will they live long in such runs as suit ordinary pheasants well. I recollect the late Lord Lilford telling me that, with all his experience, he had never been able to keep Capercaillies, and that only in one year did his Blackgame really thrive, and that was when they had the run of a large walled-in kitchen garden. This suited the birds admirably, but their ravages among the strawberries and green vegetables were so serious that the experiment could not be repeated.

All Game-birds that I have kept, including Grouse, have taken readily to Mangel-Wurzel roots, and during the winter and early spring months they are a most valuable food. But in frosty weather they must not be left out at night, or must be rolled under some dense bush, so that they do not get frozen. Coarse and fine grit and plenty of water are necessities to all Game-birds. In my enclosure there happens to be a clear running stream, which of course is a great advantage as it prevents the possibility of soiled drinking pans. Capercaillies and Blackgame feel the heat of summer, as might be expected, and must have plenty of shade. My Blackgame roosted in long grass near the stream, but the Capercaillies perch. Being heavy birds, when pinioned they are apt to injure themselves if disturbed from their roosting-places or while coming down in the mornings. It is advisable, therefore, to take off the lower

branches of bushes or trees which may tempt them up to dangerous heights; and only leave such bushes and lower trees as are safe, accessible to them. I once had a Capercaillie cock killed owing to a stranger passing under his tree and causing him to fly off his perch after dusk. My Capercaillie hens generally made their nests, as they so often do in the wild state, against the bole of a tree. They cover their eggs, and so cleverly do they conceal the nest that once a Capercaillie hen, by scraping out a hollow, managed to prevent us from finding her nest on perfectly bare ground under a beech tree, till one day we unexpectedly found her incubating.

Keepers sometimes advance a theory that grey hens do not lay till the third summer after they are hatched. Long ago I had clear evidence that this is not correct in regard to Capercaillies, and it seemed unlikely that their smaller relatives would be slower to attain maturity. But since I have kept Blackgame I found that they too will breed in their second summer. I believe the reason why so considerable a proportion of grey hens is sometimes seen without young is that, while the birds seeks damp rushy places to nest in, the chicks are exceptionally delicate, and their survival greatly depends upon the sort of weather which they have to face during the first week or two of their lives.

Redgrouse have been often kept in a half-tame condition, and more than once in recent years they have been bred in confinement. This has always I think been achieved in places where a supply of heather was available to augment their food. But I have no heather within reach, and my Grouse had to be content with meal, green stuff and bird seed (Canary and hemp), with such grass and clover as they found in their enclosure. I had a hen Grouse for over three years, which during that time never saw heather. Her habits of course altered considerably under such artificial conditions. She would, in wet weather, roost on a lower branch of a box tree, and I have seen her busily breaking up and eating an acorn.

Grouse are charming pets, and the cocks become almost troublesomely bold and aggressive. A full-winged tame cock Grouse that I used to know on Spey-side would fly in the face of any stranger in the spring-time.

I always expected that Willow-Grouse, from living on a more varied diet, would be more easily managed than the British Red Grouse, and when I obtained a small lot in 1908 I found this was certainly the case. We never had the slightest difficulty in keeping them, as they would eat all that a Red-Grouse would take, and, in addition, Birch, Sallow and Beech, foliage and twig ends. Though wild-caught birds, sent direct from Sweden, they would, in about three weeks time, run towards one at feeding time. My first birds all proved to be hens, but, nevertheless, four out of the six laid the first summer. The following spring I succeeded in getting some cocks; but, afterwards, though we hatched young, and a pair which I presented to the Zoological Gardens reared a small brood, a severe visitation of "gapes" not only prevented any further success that season, but obliged me, much against my inclination, to give up keeping any more of the Grouse family.

Although, under the supervision of the Committee of Enquiry on Grouse Disease, some 2,000 birds were dissected, and only in three examples were gape-worms (*Syngamus trachealis*) found; yet as the Committee report: "This freedom from the common pest of the Fowl-yard and the Pheasant coop is due to the free and unconfined life of the Grouse, together with the comparative paucity of earthworms on the Moor." That the above explanation is probably quite correct my experience shows, for in captivity I have found Grouse and their allies exceptionally subject to the parasite. For several years in succession, the "gapes" first affected the birds of the Grouse family in my collection; Grouse and Willow-Grouse, Blackgame, Capercaillies, then Partridges, Pheasants, Impeyans and Tragopans (I place the names in order of susceptibility), and finally it spread to other species including Bustards and the young of two species of Crane. In the cold weather we had no difficulty in keeping all these species in health, but with the warmth and drought of summer, in spite of free use of quicklime, etc., the pest regularly showed itself. Therefore I had to cease keeping some of my greatest favourites. I hope only temporarily.

When Pine branches are required for Capercaillies and Blackgame, or Sallow or Birch for Willow-Grouse, it is a good

plan to sink champagne bottles filled with water up to their necks in the ground, and to stick the branches therein. If this is done in a shady place, the foliage will keep fresh for some days even in summer. I have found Austrian Pine preferred to Scotch Fir, and my birds would never touch Larch foliage; though I believe in Scotland the contrary has been noted,

I once had four hybrid chicks hatched from eggs laid by a tame Redgrouse mated with a Blackcock. Circumstances necessitated their being placed with the ordinary Pheasants in the rearing field, and I believe they were exposed to too much sun, which, in a hot summer, is a source of danger to these natives of cool uplands, and they only survived a few days.

I now pass to the Tragopans, than which there are no more interesting Game-birds. I have for some years kept examples of three species: Temminck's, Cabots' and the Satyr Tragopan. I have bred them all repeatedly. They require shelter throughout the year, such as they can find for themselves in summer in thick Yew bushes, or Spruce trees headed back. But in the North of England at any rate, I find they are better shut into dry sheds in winter, with a peat moss floor and plenty of rough perches to climb about on. Like so many mountain species, whether mammals, birds or plants, Tragopans when brought down to low altitudes, seem very sensitive to damp cold, though they look happy enough on a dry frosty day. Mine get, and I think require, a variety of food—wheat, barley, hemp and Canary seed, green stuff and any common fruit that is available. Of monkey and tiger nuts, Tragopans and Monals are very fond, and also mine get like most of my birds Barley meal scalded with Poultry meal into a "crumbly" mass. I do not think Tragopans will live long upon hard grain alone. When first imported, Tragopans are sometimes difficult subjects, and must be tempted by raisins, earth worms, soaked maize, or in fact anything that they will eat. The young cocks do not come into colour till the second autumn, but before the first winter there will generally be a few feathers of the second plumage about the head and neck, enough to indicate their sex. The hens will sometimes lay in their second summer, but more often not.

The full display of the male Tragopan has often been

described; it is a wonderful sight, though not often visible even to its owner. The letting down of the gular flap is momentary, and the bird seems shy of exhibiting this when conscious of being watched. The more common partial "show," when the throat wattle swells and the wing is dropped to show the beautiful spotted feathering to the female bird, can be seen at almost any feeding time till the female begins to sit.

One of the peculiarities of the Tragopans, or at least the three species above named, which alone I have kept, is that they, invariably in my experience, lay their eggs, not on the ground like other Game-birds, but in trees and bushes, or disused nests of other birds such as pigeons, or even in structures of their own making. A Cabot's Tragopan once somehow discovered an old Stockdove's nest, 17ft. from the ground, in some ivy on the stem of a spruce fir. The latter was bare of branches, so that the bird had to clamber along the spreading bough of a neighbouring yew tree, till she could spring to the ivy.

But little has been recorded of the habits of the Tragopan in the wild state, and this propensity was a surprise to me. Therefore at once we began to put up old Wood Pigeons' nests or platforms, generally five or six feet from the ground. To these the birds have always made slight additions, generally in the shape of a lining of yew or spruce twigs. But though these platforms are freely taken advantage of (and I must have had well over fifty clutches of eggs laid here), on one occasion a Satyr Tragopan declined our help and made rather a frail platform of spruce twigs and branches, on which she laid her eggs. An old basket lid, covered with a layer of roots and twigs, and firmly tied into the fork of a bush will make a good nest. A lame, but otherwise healthy Cabot's Tragopan this year did not lay till she was provided with a mound like a large footstool, hidden under a bush, with a depression on the top some eighteen inches from the ground, which she could easily reach. This was taken advantage of at once. I believe Tragopans to be by nature monogamous, but in this last case the lame hen was one of two, both of which laid fertile eggs to a single cock bird.

Tragopans are quite at home in trees, and climb and run up a sloping branch without making a mistake. My birds spend

CRESTED GUINEA FOWL
(*Guttera cristata*).

much of their time, especially in wet weather, on their perches, and the young fly up and spring from branch to branch within a few days of hatching, and are very well provided with flight feathers at a tender age, as I have elsewhere recorded.

After a few weeks the young Tragopans, like the Monals, show an inclination to perch at night, and as they are by that time probably too large for the hen (if they are hatched under a foster mother) to properly brood. It is best to run her into a dry shed at night provided with perches of various heights. I have always taken the eggs and hatched them under small hens, Silkies and Game Bantams, as the clutches are small, two or three eggs, generally the former, and this probably induces the bird to lay again. After ten days or a fortnight, the young thrive best if allowed to run free during the day with the hen in some quiet place where the grass is allowed to grow long. Fresh ants' eggs, gentles, chopped egg, lettuce and meal, and when available, red currants or raspberries are all suitable food.

This faculty of climbing about trees renders it necessary to take great care that no bough of a tree within the enclosure extends to the fence, or the birds will probably escape, as they will creep out to the end of a slender branch and spring thence to a surprising distance. For the same reason, if kept in open enclosures, Tragopans must be rather closely pinioned.

The only member of the group of Monals that the amateur is likely to admire is the magnificent *Lophophorus splendens*, and it is scarcely possible to conceive anything more splendid than a well-conditioned male bird of this species, and, fortunately, their plumage is hard and they generally keep themselves smart. Much that I have said about Tragopans will apply to Monals, especially as to variety of food. But this is a much more hardy species, and though it is well to give shelter to the birds of the year in their first winter, the adults can stand any reasonable amount of cold, and if, as all wild creatures try to do, they can avoid the combination of wind and wet, they will get through our winters well enough.

The hen Monal makes her nest on the ground, and my birds have laid two or three eggs. They are excellent parents and will rear their young quite well if in an enclosure by them-

selves where there is plenty of cover and shelter from storms. It is a pretty sight, when the young begin to perch, to see the parents sitting with the young between them, each spreading a wing over the chicks; the cock taking his full share of the domestic duties.

Care must be taken to separate Monal cocks as the breeding season approaches. They appear heavy, rather stolid birds, but a strong male will persecute a weaker one with great determination, even in a large enclosure. I once missed one of two Monal cocks which had passed the winter together quite amicably. When we discovered the poor bird, he was several feet up a 9-inch drain, in which he had taken refuge; but he had been sadly maltreated and was already dead.

A cock Monal once contrived to mount nearly forty feet up in a Beech tree. He was to be seen for quite a week on a conspicuous dead branch, apparently going through a sort of display performance. Occasionally he would crouch down on the bough and utter the curious twittering whistle which is so strongly out of harmony with the bird's powerful build and sturdy appearance. We never saw him down at feeding times, but no doubt he descended occasionally. It reminded me of Wolff's famous picture of the Capercaillies' display on the pine bough, but I have always considered that our subject is strictly monogamous.

The cock Monal's ordinary display is striking enough. His chestnut tail is spread wide and brought forward rapidly over his back and withdrawn with a curious waving movement, while his wings are lowered so as to expose the white patch on the lower crest. He twists his head sideways and flattens his neck plumage so as to show the glorious metallic lustre to the best advantage. This part of the performance may be at some distance from the hen, who is, however, always visible to him. Presently he will advance towards his mate with a swaggering stride, with crest nodding, finally reaching her side by three or four frog-like leaps, and bends down touching the ground with his beak, with tail still extended to the full, the hen bird all the while, to the eyes of the human observer at all events, appearing utterly unconcerned.

With regard to the large family of Pheasants and their

allies, I have little to suggest that is likely to be fresh to my fellow aviculturists, as these birds are so extensively kept. The true Pheasants all appear to be perfectly hardy in our climate, and to my eyes they show no substantial differences of constitution or habit from the ordinary bird of our covers. But it must not be expected that they will be so prolific as the latter, for no doubt the power of producing 30—40 or even more eggs in a season is the result of semi-domestication, and of being kept for generations in pens to lay and not to hatch and rear. I have found *Versicolor* hens very poor layers, and pure Mongolian hens often lay very scantily, if at all in their second year, but much better in succeeding seasons. Keepers report favourably of the Prince of Wales' Pheasant as a hardy bird to rear, and as a species which leaves its impress (in plumage) upon his cross-bred stock for many years.

As to straying, I can see no difference; they all like to escape from overcrowded ground.

The Partridges usually obtainable are all easy enough to keep, even the beautiful *Ammoperdix* of the Desert; but the young of the species from the warmer regions are, as might be expected, very sensitive to damp, and all, whether adults or young, should have access to dry sheds, in which they can dust and shelter. I have not kept any of the Wood Partridges, and expect that they require very special treatment. Peat Moss litter makes an excellent floor for such sheds as it is absorbent and a deodorizer. Unless the ventilation is really effective, fire-heat, unless in exceptional frosty weather, is better dispensed with.

If I may offer one or two pieces of advice, I would urge that it is a great mistake to keep too many birds. Overcrowding leads to tainted ground and a host of trouble. Grit must never be forgotten as it is absolutely essential to this class of bird. A Grouse chick of forty-eight hours was found to have its gizzard well provided with grit (Report of the Committee on Grouse disease). Quartz grit is the best if to be had. After the first severe frost, lettuces and even cabbages are often unprocurable, and, until the grass grows freely, some substitute for green food is desirable for grain-fed birds. I find Mangel-Wurzel most

useful, and take care to have a supply sufficient to last well on into the spring. But, as I have already said, care must be taken that the roots do not get frozen.

The incubation periods of some of the birds referred to in this paper, as noted by me, may interest some:—Capercaillie, 26 days; Blackgame, 25—26 days; Redgrouse, 20—21 days; Willow Grouse, 20—21 days; Monal, 28—29 days; Tragopan, 29 days.

DEMOISELLE CRANES AND YOUNG
(*Grus virgo*.)

XX.

CRANES,

By R. COSGRAVE.

The various accounts written of Cranes do not give much practical advice to the amateur who seeks help with regard to the management of these most satisfactory aviary birds.

In the first place, my advice is not to purchase a cripple at any price. See that the birds are sound and healthy, do not trouble if the plumage is rough, that comes all right at the first moult. Most dealers tell us that all Cranes must have fish ; that is by no means necessary, as I have tried to show from time to time. When you get a fresh acquisition, by all means give it a little fish, but decrease the quantity daily for a week or two, finally dropping it altogether. Only in one case is it essential to give a little fish occasionally, namely, to the Asiatic or White Crane (*Grus leucogeranus*), for it is the most aquatic of all the family and an expert fisherman. Feed on good wheat, barley, small round maize, barley meal (English), and, if £ s. d. permits, give bread cut up in small pieces, which can be swallowed easily ; do not give cheap corn, it is penny wise and pound foolish to do so. The natural times of feeding are in the early mornings and evenings, hence this is the best rule to follow with birds in confinement.

All Cranes, without exception, require a good grass run, the larger the better, and, where possible, they should be located near a lake, pond or stream so that the birds can wade or wash at pleasure ; to enjoy a wash or bath they like a good depth of clear water, from one to three feet, according to the size of the bird ; the Sarus and Manchurians like it still deeper. A natural

bottom in all cases is most important ; concrete being much too hard as the birds spend a good deal of time wading about, and at night roost knee deep in water, no matter how cold and wet the weather may be.

With regard to housing in winter, one must be guided by local climatic conditions. Those that require protection in this locality, particularly at night, it may be as well to mention, viz , Cape Crowned Crane, West African Crowned Crane, Stanley Crane, Demoiselle Crane, Wattled Crane, and Sarus Crane ; these are driven in pairs into houses at night after the 1st of November each year, and are only allowed to remain out when the winter is well over. During the day we keep them in as little as possible, although the houses are good in every way. By careful housing during the winter you can keep the birds in good health and, as the nesting season comes along, you stand a much better chance of having nests with fertile eggs, a most necessary point to mention. Under no consideration, while the birds are indoors, place water or food on the ground, but put it into pans in a convenient light corner, where the birds can see them well, and raise them at least twelve inches from the ground, as by so doing the birds cannot foul them. Bed down with peat moss, and do not forget to have plenty of overhead ventilation, as well as that from the windows, and when hard frost and perhaps deep snow is on the ground admit as much sunshine as you can, and all will go well. Should it so happen that the snow lies more than two days, we sweep a good piece, say twelve yards by four yards or thereabouts in a sheltered corner, and this the birds make good use of if let out.

The period of incubation of Cranes varies. The species which have bred here are: Canadian, White-necked and Manchurian, and incubation takes 30 days ; Wattled 36 days. A pair of Stanley Cranes at present have a nest here with the usual complement of two eggs ; they have been sitting 32 days, and as we have no idea of the time these birds take to incubate, you can imagine our hopes and fears. Both male and female sit well and take turn on the eggs. All the Cranes' eggs that I have seen bear a strong family likeness and are small for the great size of the birds ; the colour of the eggs varies slightly, and they are

deposited with the same regularity, viz., one clear day between the first and second eggs. The nest is merely an apology, a few bents of grass or any rubbish handy is pulled together; sometimes this is not done until the first egg is laid. The Siberians take the most pains, and are not satisfied unless a considerable heap is got together, especially if they can get flags of any kind, which they pull up by the roots. Owing to their aquatic habits, the nest is built as near the water as possible, hence the idea of a large nest to keep well above the water-line.

Both species of Crowned Cranes have made nests this year, and we have daily expected to see an egg from the Cape Crowned (*Grus chrysopclargus*). These elegant creatures are a joy for ever, when seen, as they are here, in the very best of health and plumage; they are perfectly tame, and are pleased to welcome one and make friends at all times. The graceful way in which they dance about to amuse one is most entertaining; no matter how many people witness the performance, they appear to enjoy laughter; in fact, the more you laugh, the more they dance, bow, and skip about with half-open wings, showing all their wonderful variation of colours. They may be very highly recommended for any lawn or garden, being perfectly harmless, and they do not dig up the turf like most of the Cranes. The long life and hardiness of this family in confinement should appeal to all lovers of birds who can afford to keep them.

My humble remarks will, I hope, be of help to attain success, and are meant as such, not that I want to imply that my way is the best, I merely state the conditions that answer admirably here.

The call of the different species of Crane differs considerably, no two are alike; to describe them correctly requires the skill of an artist, and it would be a complete failure on my part, not knowing a note of music, to attempt it. The male and female are so much alike that, unless you know what sign to look for, it is a difficult matter to tell them. When the birds are calling or showing fight the pair usually stands together and the female holds her head quite upright, not a movement of her body takes

place; on the other hand, the male stands likewise, but at each note he throws up both wings from behind, leaving his back and tail quite exposed: this goes on for a minute or two with automatic regularity. The fighting attitude of the Asiatic Crane is most amusing: he stands quite still, with his great bill hidden in his tail and end of wing-feathers, and when about to be attacked by anything, and the foolish being comes within striking distance, out comes the bill like a flash of lightning, and is used with terrible effect. This action puts one in mind of a man drawing his sword from its sheath in haste to defend himself.

The males of the Demoiselle and Crowned Cranes are not so easy to determine, one has to be guided by the action of the birds: they usually are slightly larger, and with well-defined lines of plumage and also the voice of the male is much deeper in tone and more prolonged.

During the migration period, in spring and autumn, all Cranes, without exception, get very excited in the hope of getting away, making determined attempts to get on the wing, in spite of being pinioned, especially if a strong wind is on. You will see them go down wind to the extreme end of the enclosure, then start to run and fly their hardest up wind, and very often clear the fence and land in another enclosure, when they are promptly attacked by the rightful owners. At these times the call is much more shrill, the Sarus can be heard several miles away down wind.

XXI.

NOTES ON OUT-OF-THE-WAY BIRDS.

By FRANK FINN, B.A., F.Z.S.

Although we have heard a great deal about aviculture as a scientific study, the fact remains that the avicultural purview has so far remained very limited, and neither in private collections, bird-shows, or Zoological Gardens do we find any all-round representation of the many families of birds; yet, without this all-round representation, aviculture cannot be said to be scientific. The reason is, of course, that the ordinarily-kept families, such as passerine birds, parrots, doves, pheasants and ducks, are so much easier than the others that the temptation is to acquire good series of these and to consider that a rare *species* is a great acquisition, while neglecting a *family* which is seldom kept at all.

The rarer families of birds have, however, always had a great attraction for me; not only are they likely to be of more scientific interest, but they are often by their very unfamiliarity of form and ways, more pleasant to watch, while some species among them may be far easier subjects than many birds belonging to the more ordinary avicultural groups. For instance, for a bird which has the distinction of being the unique representative of its family, easy to keep, and interesting in its ways, we may refer to the Kagu (*Rhinochetus jubatus*) whose quaint and affable manners we have mostly admired at the Zoo. The first known egg of this species, by the way, was laid there many years ago—a triumph far greater than the modern breeding results we hear so much about.

I purpose here, then, to say something about members of

rarely-kept families of which I have had personal experience, and I shall use my own experience as a peg on which to hang remarks or suggestions *re* the treatment of out-of-the way birds which I have only seen kept by others, chiefly at various Zoos, which are not, unfortunately, usually good schools for high-class scientific aviculture, though an absolute beginner may learn much there about the keeping of hardy unkillable stuff.

For a full account of what groups have been bred in captivity and their incubation periods, &c., I may refer to my book "The World's Birds."

Among perching birds, these families which are called in the less modern works "Picarian" (*i.e.* all perching birds other than Passerines and Parrots have always been my favourites), and when I went to India I was delighted with the commonness of Rollers, Bee-eaters, Woodpeckers, and Barbets, and soon set to work to acquire experience which might be of use to amateurs not so happily situated. I found that the young of that glorious creature the Indian Roller (*Coracias indica*)—always called Blue-Jay in India—were quite easily reared on cut-up raw meat and cockroaches; the cockroaches were very satisfying, being of the great American kind (*Periplaneta americana*) now thoroughly established in India. The same food also suited adults, which I have successfully "meated off," beginning with cockroaches with the heads pulled off, which leaves them helpless but kicking, then going on to small dead fish and shrimps, and finally proceeding to the raw meat.

Fish and shrimps are, of course, unnatural food for thorough land birds like these, but they take the place of lizards and large insects, and are suitable for all birds which eat these; Rollers especially need something with hard parts in it, to form their pellets, for like so many (though not all) insectivorous birds, they cast up the hard parts of their food like birds of prey. Rollers are not at all suited for cage-life—no birds which either sit still or fly are so, unless very small—and if they have to be confined in a cage at all this should be as long as possible and have only two perches, as mentioned in my remarks on transport. In aviaries they are charming, and the European species was bred successfully in 1901 by our member Mr. St. Quintin, the

GOLDEN-THROATED BARBET
(*Cyanops francikini*).

young birds being reared at first on insects, then on chopped-up raw rabbit (fur and all) and hard-boiled egg, which was the usual food of the old birds.

Rollers will devour any small bird they can swallow, and I have seen both the European and the Indian species at the Zoo greedily gulp down lettuce in large pieces. Chopped lettuce should therefore be supplied, and it is as well to dilute, as it were, chopped raw meat with biscuit-meal or dry-boiled rice. Suitable companions for Rollers are other large insect-eaters and such birds as small Gulls, Plovers, and the Great Laughing Kingfishers (*Dacelo*).

Woodpeckers I never bothered much about, as they are better known in Europe than Rollers, but I reared chiefly on cockroaches, the beautiful Golden-backed species (*Brachypternus aurantius*) which is the commonest over most of India, and the best Woodpecker I have seen in captivity. However, our own species are so good, that they quite sufficiently represent the family, and I hope some who have had experience with them will summarize their results with this family in the present series.

I never troubled to send any Rollers or Woodpeckers home, there being already European species available, for I made a rule, when sending birds for the Zoo, to avoid as far as possible, representatives of groups already available either in nature or in the trade, holding that it is not the business of a scientific official to encourage stinginess or want of enterprise in scientific societies, or to interfere with the hard-earned livelihood of those much and unjustly abused individuals, our dealers.

For the same reason I had little to do with Barbets, the Blue-fronted (*Cyanops asiatica*) being already well-known when I went to India in 1894; but my experience with the Copper-smith or Crimson-brested Barbet (*Xantholæma hæmatocephala*) may be worth recording, as it throws light on some recurrent avicultural problems. In the Marshalls' monograph of the *Capitonidæ* or Barbets will be found the statement that Barbets do not thrive in captivity, a statement that has been duly copied by other writers ignorant of aviculture. Now everyone knows that Barbets are easy subjects, treated as Mr. Townsend has

recommended for Tanagers—in fact, the Blue-cheeked is one of the easiest soft-bills, (the term is used technically, not literally, as all Barbets bite like fiends) one can keep; and I fancy that my friend the Coppersmith started the story. He is the commonest of Barbets, plying his miniature gong in the street trees in Calcutta; yet I was told he could not be kept. I thought the reason was that *sattoo*, the standard soft-billed food, did not suit him, and I found that adult birds could be meated off, or rather “fruited off” on banana, and live on that alone; young birds could also be reared on this simple diet, and I found that at any rate when reared, bread-and-milk could be consumed with impunity. Since then, a few have reached England, and, though undoubtedly delicate compared with others, this charming Barbet is evidently not the impossible subject our native dealers supposed. Small blame to them—they were probably feeding birds on *sattoo* in the time of Alexander’s invasion, and I was not surprised that my success did not alter their methods—should the aviculture of ages be upset by a mushroom European? I, however, profited by the lesson and by the similar one I learnt in connection with the Cotton Teal (*Nettapus coromandelianus*) another impossible bird (of which I sent the first specimens home) and have since steadfastly refused to believe in the impossibility of keeping any bird. The Asiatic Barbets, by the way, are far more purely fruit-eaters and more unsociable than the two African species I have seen.

I have had some most interesting experiences with Cuckoos, an interesting group which are grossly neglected as a rule. The easiest of all is the Koel (*Eudynamis honorata*), which is a favourite cage-bird in Calcutta, and should be represented in any scientific collection. Being, unlike most Cuckoos, a fruit-eater, it is easily catered for. It is parasitic on crows, and a pair of tame jackdaws or magpies should make good fosterers for it. Being so common, and having been exhibited at home, I did not trouble about it, but more than once reared specimens of that fine non-parasitic cuckoo the Indian Coucal (*Centropus rufipennis*) locally known as the Crow-pheasant, a name much apter than it sounds. In habits and general form this species resembles a magpie, and can be reared on cut-up raw meat, snails, and cock-

roaches, and when grown allowed liberty about a garden. It is an enemy to any small bird it can catch, and will eat lizards and snakes. I had one loose which fed itself on toads and refuse boiled rice! This bird has been represented at the London Zoo, and ought always to be on view. Another non-parasitic cuckoo, the Guira or White Ani (*Gnira guira*) of South America, has also been frequently imported, and has bred in this country. Like the Crow-pheasant, it is carnivorous.

I was lately shown a fine specimen of our common cuckoo, belonging to Mr. Harwood, the taxidermist, whose success as an aviculturist in keeping this bird (and in a thrush cage till it has come into full adult plumage), is as remarkable as his beautiful taxidermic work. The bird, it is useful to know, has been fed almost entirely on hard-boiled egg and mealworms, though of course, like most cuckoos, it greatly appreciates hairy caterpillars.

Trogans have never fallen to my personal lot, but the first one I ever knew to be kept in captivity since the time the ancient Aztecs kept the Quezal (*Pharomacrus mocinno*) for its feathers, was a specimen of the Indian Red-headed Trogon (*Harpactes erythrocephalus*) which we had in the Calcutta Zoo in my time. This was fed entirely on grasshoppers and cockroaches, and kept in a cage. I also recently saw again the first Trogon ever brought to England, the Cuban Trogon (*Prionotelus temnurus*) which was imported by Mr. Frost in 1907, and had been in Mr. Maxwell's hands. Other specimens have since been imported, and the Zoo have owned one and had two (I believe a pair) on deposit, but in neither case did the birds live a fourth as long as Mr. Maxwell's. Private individuals' birds must be expected to have an advantage in the fact that their owners have paid for them themselves; but the fact that no attempt was made to encourage the pair (?) exhibited to breed, or even to put them in an outdoor flight, shows how little science is regarded at the Zoo. The young stages of Trogons are almost unknown, and to have elucidated them would have been to win some of that respectful recognition from skin-ornithologists for which some of our aviculturists are continually hankering, as if the study of live birds were not infinitely the more scientific of the two, if people's needs must specialise!

The only observation I have been able to make on captive Trogons is that they hop when moving on the ground, not waddling like Bee-eaters or most Kingfishers. I should recommend anyone keeping them to hang up bunches of grapes or berries in their aviary, as the fruit-eating forms, like the Cuban, which are the only ones we are likely to get yet awhile, dart out and pluck their fruit on the wing as if taking insects. They would need a covered nest-box, as they breed in holes, and though more active on their feet than many short-legged birds, are eminently not birds for small cages.

Kingfishers are very easily obtained in India, and I have hand-reared the common species—much commoner out there—the beautiful Pied (*Ceryle rudis*) and the great Stork-billed (*Pelargopsis gural*); all Kingfishers are easily brought up if one has fish to give them and can stand the yells and smells they generate. When they are reared, however, the difficulty begins, as they knock themselves about in a cage, and in an aviary are generally too quarrelsome for even a pair to live together, though individuals of different species will do so. For aviculture, therefore, the best species are the well-known Laughing Jackass (*Dacelo gigantea*) and the Sacred Kingfisher (*Halcyon sancta*) both birds of which the pair will live together, and land-feeders, so that they will do well on raw meat, to which must be added such items of food as mealworms, mice, small fish and large insects.

From the point of view of a very large proportion of aviculturists who must perforce be content with small accommodation, the most desirable group of the Picarians or non-passerine perchers is the family of Humming-birds; while hardly any family surpasses them in intrinsic interest, owing to their tiny size in so many cases, their frequently wonderful colours, and their pre-eminent adaptation to flight. This would at first seem to put them out of court for most aviculturists, but the fact is, that their speciality in flight is rather active evolutions in a small space than remaining long on the wing, which they do not do, according to those who have observed them wild. This facility in circumscribed flight could have been studied with great advantage in the case of a pair of Prevost's Hummer (*Lampornis prevosti*), which, alone out of a consignment of

eighteen humming-birds of different species, succeeded in surviving a month at the Zoo in 1908. The male, indeed, lived five weeks—I remember this well, because I promised the keeper a shilling for every bird he kept over the month, and much regretted I had only this individual to pay for. He also grew a tail during his captivity here, showing that he was not nearly “on his last legs” constitutionally. In fact, as only three of this species were in the consignment it is pretty obvious that Prevost’s Hummer is fairly hardy as Hummers go, and I should recommend anyone who has access to Venezuela to specialize on this species if he wants to get Humming-birds over alive.

It must be remembered in keeping Hummers that they have very little use of their feet except as grasping organs: I never saw any of the Zoo specimens try to walk or hop if they found themselves on the ground, and even in moving along their perch they whizz the wings. Newly-imported specimens, therefore, should have their perches so arranged that they can sidle along them to get at the food and water—for they drink freely though living on syrup. Once they are well-established and flying strongly the fewer perches the better. Of course these should be often cleaned, as the birds have a curious trick of grasping their long thin bills with their feet and wiping them down, any stickiness thereby accruing being promptly transferred to the perch, of course. For bathing the Prevosts’ preferred a large leaf which had been sprayed on—no doubt a natural habit—but would also use a pan with a piece of moss in it. The cock took no notice of the hen except to pull her off the wet leaf by the scruff of the neck when he wanted a bath, and they kept as far apart as possible, so that solitary confinement would seem to be no hardship for a Humming-bird. A very high temperature is necessary, at any rate for newly-imported birds, as they become torpid like reptiles or very young nestlings if the temperature falls too low. This, however, seems to do them no harm; a female Ruby-and-Topaz Hummer (*Chrysolampis moschitus*) in this consignment, arriving torpid, was placed on the hot water pipes for resuscitation, revived suddenly, flew all over the house for a long time without striking the glass, fell down on a Marmosets’ cage, was rescued from the clutches of a Marmoset

which had grabbed its head, and about a quarter of an hour later was hovering in its glass-sided case, apparently trying to peep into the lens of a camera which was being operated in front! Surely so robust a minikin ought to have lived longer than it did; the tameness it showed was characteristic of the group, which excel in this lovable and desirable peculiarity.

Provided they can be kept warm and *clean* (a most important point), the chief difficulty with these birds is evidently the provision of suitable food; but as this has been got over with the Sunbirds (*Nectariniidæ*), which belong to an entirely different group, being true Passerines, we need not despair of seeing Humming-birds also more commonly and successfully kept sooner or later. It is true that Sunbirds hop about in the normal way, and are not quite so sensitive to cold, apparently, but that they were not easy to begin with the following experiences of mine may show.

In 1897, I started from Calcutta with twelve Amethyst-rumped Sunbirds (*Arachnechthra zeylonica*), a selected lot—for to avoid useless waste of life I had liberated at least as many, which did not look like doing well—and one Purple (*A. asiatica*), the only one I could get, and in moult at that. Although I arrived home about midsummer, all the Amethysts died *en route*—the last in the train going up to London—evidently from cold; the one Purple reached the Zoo, and lived there about a fortnight only, though treated with every care by that excellent former keeper of the Insect-House, Quantrill.

So far as I know, these were the first Sunbirds to reach England, or Europe for that matter; and had I argued as some people do about Humming-birds, I should have said that Sunbirds were not worth trying with again.

The subsequent experiences of others, especially of Mr. A. Ezra, have shown, however, that even the delicate Amethyst can be shown and moulted successfully; while the Purple, which has confirmed my scanty experience by proving much the hardier, can not only be so treated, but has been kept by a dealer (Mr. J. D. Hamlyn) in numbers in a store-cage in a sitting-room for nearly a year—a good record for a soft-bill of any sort.

So that, as on the evidence Prevost's Hummer should be

even harder than the Purple Sunbird, to say nothing of the other, there is nothing to despair about, and when this species is fully understood we can proceed to others with more confidence.

I fed my Sunbirds on diluted condensed milk mixed with crushed biscuit and powdered hard-boiled egg-yolk, but in the light of the subsequent experience of others, I should recommend a mixture of honey, condensed milk, and Mellin's food, to be given in a shallow covered vessel with holes in the cover; and this ought to serve for Humming-birds also. Aphides and spiders should of course be provided wherever possible, though I cannot say that the Zoo Humming-birds specimens cared much for those given to them—they may have become inveterate syrup-bibbers!

The unidentified Humming-bird imported by Mr. C. Harris in the autumn of 1910, however, was actually reared on honey from the nest, and anyone who reads Gosse's account in the *Birds of Jamaica* of his rather blundering attempt to keep the splendid *Aithurus polytmus* of that island on syrup only will see that that species has a resistant constitution, and would probably do well with better food and more careful treatment. Sunlight, judging from my observations on the Zoo birds, is not indispensable to Hummers, and is even shunned by some when wild, such as the magnificent Crimson Topaz (*Topaza pella*) of Tropical America, which haunts the forest shades, while some species, such as *Selasphorus rufus* in North-west America, and *Eustephanus galeritus* in Tierra del Fuego, range into climates far more cold and bleak than any inhabited by Sunbirds.

To pass to very different groups of birds, in dealing with my especial favourites the Waterfowl, I have also followed as a rule the possibility of avoiding familiar types for export, the chief exception I made being in favour of the Pigmy Goose or Cotton-teal (*Nettapus coromandelianus*) above mentioned; the difficulties in keeping this bird I have dealt with previously (*Avic. Mag.*, VII. 1901, p. 129); I may summarize them here by saying that they consist simply in the fact that the bird is very groggy on its legs and at the same time foolishly eager to climb up wire-netting, so that its enclosure on first capture if small, must be arranged to obviate this. Cotton-teal should always have plenty of water and be kept under netting, unopinioned, as

they fly cleverly and perch freely; they are delightfully tame, a rare virtue among the smaller ducks. They feed on the ordinary duck foods.

The same difficulty about land locomotion besets him who would keep the delightful family of Grebes; they are very bad on their legs, especially the larger species, but fortunately do not try to climb. Their plumage very soon loses the water-resisting power if they are kept out of water, so that they must be accustomed to it by degrees. When hardened off, they should be allowed only small landing-places—say about a yard square—at each end of their water-space, or as an island in the middle. The rest of the edges of the pond should be wired, and if the water can be given a serpentine form, so as to ensure as much swimming exercise as possible, it will be all the better.

I have always fed Grebes on fish, adding insects for Dabchicks, but I have seen the Great Crested Grebe recently kept in the Wader's aviary at the Zoo taking meat on shore, and even robbing the Waders when they took a bit to the water to wash it. As Grebes also take vegetable food, rice and chopped lettuce might well be offered with advantage. An aviary is not a suitable place for them, as they require water-range above everything, and cannot rise on the wing in a small space, so they may as well be clipped or pinioned, except in the case of Dabchicks when on water that is not running and so liable to freeze. Divers and Auks could no doubt be kept in the same way.

Among Waders, I took particular interest in the curious Jaçanas (*Parridæ*), though my fondness for especially beautiful birds led me to specialize in the Pheasant-tailed species (*Hydrophasis chirugus*), albeit this is the least typical of its family, being more Plover-like than the rest.

These I found lived well on boiled rice mixed with chopped raw fish or hard-boiled egg, but soon became dry and cracked about the hocks if kept long away from a pond, for they did not seem to have the sense to make much use of a mere shallow tray of water. In nature they keep mostly on floating vegetation, swimming occasionally but not often enough to keep their legs wet, so that this peculiarity of the skin puzzles me. It indicates, however, that their legs should be frequently wetted

with fresh water in a travelling cage, either by spraying or sluicing, or better by immersing the bottom of the cage in a bath whenever possible. When established they should be kept where they *must* wet their legs to get food, and ought to be taken indoors in winter; I fancy, however, that if the lot I sent to the Zoo for the first time in 1901 had been kept in the excellent little aviary in the Fish House instead of in the Western Aviary, they might have lived longer. Combining the grace of the Crane with the size of a Collared Dove, they are beautiful even in winter plumage, and in the long-tailed summer garb so exquisite, that they make the daintest ducks look coarse in comparison. Their huge long-toed feet do not look ungraceful as the birds stand on the weeds, or even on the ground: but one point is to be noted about these feet, that the long hind-toe is very weak and easily gets bent forward permanently. While the birds thus effected still walk well, I always turned loose on the Calcutta Museum tank all that went that way, along with other weaklings, some of which did well and stayed even when not clipped. Thus I was able to see them feeding: they ate chiefly water-snails, turning over the leaves to get them, but would take paddy-rice thrown in. Water-snails, by the way, are appreciated by a large variety of water-birds; among my own specimens, I saw them regularly eaten by ducks, both surface-feeders and divers, flamingoes, and coots. They also come in handy for land-birds, and being so easily collected and kept, should not be neglected by aviculturists.

To return to Jaçanas; I found them, though peaceful in confined quarters, rather unsociable on the tank, the large strong hens especially keeping their "worse halves" aloof. In an aviary with other water-birds they should do well, but if no water-plants are in the pool some artificial floating leaves of thin wood should be provided to make them feel more at home, as they are really "lily-trotters, not mud-larks or beach-combers like other waders,

I will add, in conclusion, a few notes on another out-of-the-way wader I was the first to introduce—a Pratincole (though the general management of these does not differ to any important extent from that of small waders generally as laid down by Mr. Barnby Smith in this series), because it just shows how one may pick up a good bird casually. It was when I was on the East

African coast twenty years ago, and out with Mr. Macalister of Mombasa, in whose name I presented the bird to the Zoo. He shot and winged it, breaking the fore-arm, and we took it home alive. I cut off the broken part of the wing, placed it in a rough box-cage and fed it on grasshoppers, but it soon left off feeding, so I had to cram it for some days, but ultimately got it on to eating raw meat by itself on board ship, and it reached the Zoo safely to thrive in Quantrill's care. It was the Madagascar Pratincole (*Glarcola ocularis*) not previously known from Africa.

I may mention that, opportunities having been lacking, I had never kept anything more difficult than a blackbird before this trip, but I brought home, in addition to this Pratincole, a Green-necked Touraou (*Gallirix chlorochlamys*), a Fruit-Pigeon (*Treron delalandii*), three Black Gullinules (*Limnocorax niger*), a Crow Pheasant (*Centropus superciliosus*), presented by various donors, all new to the Zoo, besides other live-stock, although I was sent to collect earthworms, and of course got them too, both pickled and living.

I feel that this finale, and this article generally, has a rather egotistical vein running through it, but I hope this may be pardoned in consideration of my idea of writing thus, which has been to show that the keeping of out-of-the-way birds chiefly depends on the wish to keep them, and that if one will only give one's mind to it, the pioneer work of aviculture, though difficult, is not absolutely heart-breaking.

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