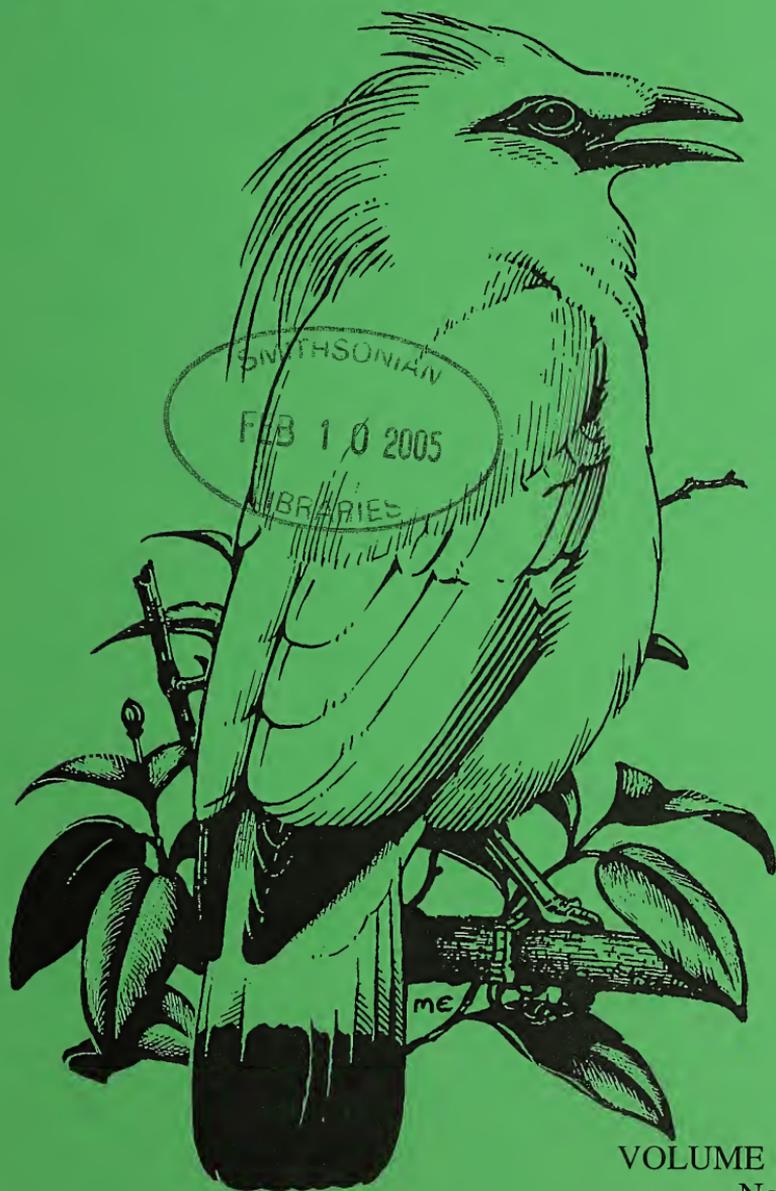


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2004

THE AVICULTURAL SOCIETY

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ADDRESS OF THE EDITOR

Malcolm Ellis, Hon. Editor, The Avicultural Magazine, The Chalet, Hay Farm, St. Breock, Wadebridge, Cornwall PL27 7LL, England.
E-mail: editor@avisoc.co.uk

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2004

BREEDING THE RED-CRESTED CARDINAL

Paroaria coronata

by Gary Bralsford

I had always fancied keeping and breeding Red-crested Cardinals but their limited availability and high price (£90 - £250 (approx. US\$160-US\$450) a pair) held me back. Then in 2002 a large number were imported from South America and the price came down to a more affordable level.

I purchased two pairs in September of that year and placed all four birds in an indoor planted flight 8ft long x 4ft wide x 6ft high (approx. 2.4m long x 1.2m wide x 1.8m high). I sexed the males by their scarlet red bibs that went down their throats to a point, their slate grey backs, and their lovely warbling song.

The pair that nested built a nest high up in a wicker nest pan, that was fixed to a bracket which was covered with conifer cuttings. The male did most of the nest building and the nest was completed in about four days. The first egg was laid about six days later. A total of three eggs were laid. They were grey-blue with dark blotches at the blunt end. Both the male and female took turns to incubate them for 14 days.

When the eggs hatched I provided the parents with buffalo worms and waxworms. Crickets that I put in a bucket were completely ignored. After nine days two of the chicks were found dead on the floor, but the third chick was reared to maturity.

The pair went to nest again and as the breeding male had turned aggressive towards the other male, I removed the latter, leaving the first male with two females and this time he paired up with the second female. I was able to identify the two females as I had placed slit rings on their legs. The pair just added a few pieces of coconut fibre to the first nest. Again there was a clutch of three eggs and three chicks hatched after 14 days. Two out of the three chicks were reared.

I was providing about 750 waxworms and 500g of buffalo worms per nest. The two females between them went to nest another five times and managed to rear a total of nine young. I lost two at the weaning stage, but

remained very pleased with the seven that were reared to maturity. When they left the nest the young were not very strong flyers and would fall to the floor when trying to take off from a perch. They would then scramble up the wire to reach another perch.

They were duller, short stubby-tailed versions of their parents, with the crest already visible at this early stage. After about four weeks with their parents they could be separated. The adults were model parents and did a brilliant job of rearing the young. I think four nests is about right, as young from further nests are often weaker birds. The male was very aggressive during the breeding season and would attack the birds in the next flight through the wire.

At the end of October I separated them for the winter. Although I have now kept the original birds in indoor flights for almost two years, the red has not faded and is as bright as that of recently imported birds. They have access to a good quality British finch seed mixture and softbill food. I also give them fruit such as apple and pear, plus a few mealworms, and they have remained in tiptop condition on this diet.

It was an education to watch the male display to and mate with the two females. At one point I had a female sitting on three eggs and the other female attempting to build a nest in a seed pan and even laying eggs in this makeshift nest. During the course of the year both females laid eggs and reared chicks in the original nest. I witnessed both females with the male feeding the chicks. By the end of the 2003 breeding season the conifer cover had died back and the nest basket was in full view, but at no time did the sitting females come off the eggs or leave the chicks when I was present.

In future I intend to provide a larger nest basket, as I felt the one that was used was on the small side. I think I could have ended up with a few more chicks had the basket been larger.

* * *

NEW NCA WEBSITE

The National Council of Aviculture (NCA) has now got a new website:
<http://nca.mysite.wanadoo-members.co.uk>

HORNBILLS IN THAILAND - 2003

Hornbills in Thailand, *Avicultural Magazine* Vol.109, No.2, pp.57-61, 2003, gave a brief description of the work of the Hornbill Research Foundation in Thailand and its Hornbill Family Adoption Program, followed by a report on the 2002 nesting and fledging of a chick by the pair of Bushy-crested Hornbills *Anorrhinus galeritus* adopted by the society.



Great Hornbill arriving at nest-hole with a lizard.

At the Council Meeting held on Saturday April 5th 2003, the decision was taken to continue for a further year to support the study of this pair of hornbills and to adopt a second pair of a different species. A pair of Rhinoceros Hornbills *Buceros rhinoceros* was chosen as the second species. Later, however, we were advised that it looked unlikely that the pair of Bushy-crested Hornbills was going to nest in 2003, so we instead decided to adopt a pair of Great Hornbills *B. bicornis*. So, in 2003, the Avicultural Society adopted a pair of Rhinoceros Hornbills and a pair of Great Hornbills, as part of the Hornbill Family Adoption Program.

Dr Pilai Poonswad, Secretary-General of the Hornbill Research Foundation, has written to thank the society for its support during 2003 and has provided the following information on the two pairs of hornbills adopted by the Avicultural Society:

Species of hornbill: Rhinoceros Hornbill *Buceros rhinoceros*

Location of nest: Budo Mountain, Raman District, Yala Province, Thailand

Nesting data:

Female imprisoned in nest: March 29th 2003

Female emerged: June 17th-22nd 2003

Chick fledged: July 27th 2003

Type of parental care: Father-mother (Female joined her mate to feed the chick)

Period of data collection: March 20th-July 27th 2003

Breeding status: This nest was successful in fledging one chick

Nest tree data:

Villagers responsible for the nest: Mr Dohrohing Waetohya, Mr Haseng Kariya and Mr Abdulmana Braheng

Year nest was found: 1997

Species of nest tree: *Bombax* sp.

Diameter of tree at breast height: 320cm (approx. 10ft 9in)

Height of nest tree: 57m (approx. 187ft)

Coordinate (UTM) X:0786033 Y:0719586

Altitude above sea level: 410m (approx. 1,350ft)

Slope of nest tree: 25%

Diameter at nest height: 70cm (approx. 2ft 4in)

Height of nest above ground: 46m (approx. 150ft)

Size of nest entrance: 27cm wide x 15cm long (approx. 10³/₄in wide x 6in long)

Direction of nest entrance: 345° (NNW)

Species of hornbill: Great Hornbill *Buceros bicornis*

Location of nest: Budo Mountain, Ruso District, Narathiwat Province, Thailand

Nesting data:

Female imprisoned in nest: March 12th 2003

Female emerged: June 9th -13th 2003

Chick fledged: July 13th -14th 2003

Type of parental care: Father-mother (Female joined her mate to feed the chick)

Period of data collection: February 19th - July 15th 2003

Breeding status: This nest was successful in fledging one chick

Nest tree data:

Villager responsible for nest: Mr Hawa Kajay

Year nest was found: 2001

Species of nest tree: *Neobalanocarpus heimii*

Diameter of tree at breast height: 280cm (approx. 9ft)

Height of nest tree: 53m (approx. 174ft)

Coordinate (UTM) X:0785647 Y:0718515

Altitude above sea level: 450m (approx. 1,500ft)

Slope of nest tree: 9%

Diameter at nest height: no data

Height of nest above ground: 25m (approx. 82ft)

Size of nest entrance: 20cm wide x 12cm long (approx. 8in wide x 4³/₄in long)

Direction of nest entrance: 290° (WNW)

Summary of hornbill nesting in 2003.**Khao Yai National Park**

	No. Nests	Female Imprisoned	Successes	Failures	No Data
Great Hornbill	34	16	13	3	0
Wreathed Hornbill	12	5	3	2	0
Brown Hornbill	11	8	8	0	0
Oriental Pied Hornbill	42	28	22	6	0
Total	99	57	46	11	0

Huai Kha Khaeng Wildlife Sanctuary

	No. Nests	Female Imprisoned	Successes	Failures	No Data
Great Hornbill	21	3	2	1	0
Rufous-necked Hornbill	16	7	1	6	0
*Plain-pouched Hornbill	15	ND	ND	ND	15
*Brown Hornbill	22	ND	ND	ND	22
*Oriental Pied Hornbill	79	ND	ND	ND	79
Total	153	10	3	7	116

* Species unattended due to separated habitat and insufficient personal.
ND = No data.

Budo Sungaipadi National Park

	No. Nests	Female Imprisoned	Successes	Failures	No Data
Great Hornbill	49	23	21	2	0
Rhinoceros Hornbill	35	5	3	1	1
Helmeted Hornbill	13	3	3	0	0
Wreathed Hornbill	12	3	2	1	0
Bushy-crested Hornbill	13	2	0	2	0
White-crowned Hornbill	6	0	0	0	0
Total	128	36	29	6	1

Further information about the project can be obtained from : Dr Pilai Poonswad, Secretary-General Hornbill Research Foundation, c/o Department of Microbiology, Faculty of Science, Mahidol University, Rama 6 Road, Bangkok 10400, Thailand. Tel: 66-2201-5532/Fax: 66-2644-5411/ E-mail : scpps@mucc.mahidol.ac.th

MAGPIE RESCUING ITS MATE FROM A CARRION CROW AND OTHER CROW VERSUS MAGPIE ENCOUNTERS

by Derek Goodwin

The enmity that exists between Magpies *Pica pica* and Carrion Crows *Corvus corone* is well known. In his splendid monograph on the magpies of the genus *Pica*, Birkhead (1991) discussed this in some detail and stated, rightly in my opinion, that this enmity is more harmful to the Magpie than to the Carrion Crow, which sometimes succeeds in killing Magpies and often in robbing their nests. Wittenberg's long-term studies on Carrion Crows in Germany (Wittenberg, 1988) showed the Magpie was the only species whose numbers were reduced when Carrion Crows increased in the area.

The apparently great risks that Magpies often take and the nearness with which they will often approach Carrion Crows on the ground, though never, in my experience, one that is above them, unless both are in some densely branched tree in which the Carrion Crow cannot move quickly, are due, as Lorenz (1931) pointed out, to the Magpie's remarkably quick reaction time and dodging ability which enable it to take such apparent risks with predators. I think myself that, even when 20 or more Magpies are mobbing a crow and close around it on all sides, only a Magpie whose own mate or young is held or endangered by the crow, actually risks physically attacking it. Similarly Jays *Garrulus glandarius* and Wood Pigeons *Columba palumbus* will sometimes initiate attacks on Carrion Crows (and Jays also on Magpies) when nestlings or recently fledged young are in danger, although at other times they seek only to keep at a safe distance from a Carrion Crow and immediately retreat if very closely approached by one (pers. obs.).

In my garden (watching with binoculars from the house) I have seen a Carrion Crow suddenly fly at and seize a flying adult Black-headed Gull *Larus ridibundus* (that looked 100% fit and showed no sign of impeded flight) and fall to the lawn with it. But the gull struggled and managed to peck at the crow every time the crow tried to peck it. This always caused the crow to draw back out of reach of its victim's open bill. After a minute or two, with a sudden violent struggle, the gull was free and flew off. A young (trespassing) Carrion Crow was brought down in a similar manner and given several vicious pecks but these ceased when it managed to present its opened bill at its captor and it too got free and fled.

I have twice seen Wood Pigeons and once a feral pigeon grappling in flight with a crow but each time before they reached the ground they got free, though with the loss of many feathers. I have in the 19 years I have lived in my present house seen scores, probably hundreds, of attempts by

Carrion Crows to catch Magpies, all of which failed. One male Magpie which had a very slightly deformed or (more likely) injured wing but whose flight did not show any imperfection unless one watched him very closely, was especially liable to attacks. He visited my garden for four years, for the last three of which he and his mate successfully reared young, and had many escapes from the pair of Carrion Crows. He suddenly vanished though and I think because a crow got him in the end. On two occasions I have seen, in open fields in which horses are grazed adjacent to a public country park (dog park would be a more descriptive title), a Magpie that had already been captured by a crow. In each case my attention was drawn by the outcry of Magpies already at the spot and the sight of others streaming towards it from all directions.

In one case I was too far away and the ground between sloped slightly upwards, so I could not see much detail but I think the victim escaped, as I saw one Magpie emerge from the crowd, fly low and straight towards some dense Hawthorn scrub and vanish into it and as this happened all went quiet, the other Magpies at once disappeared and the crow also flew from the spot. In the other case, which occurred on May 16th 1999, the Magpie was killed, in spite of about 30 mobbing Magpies in a close circle around the crow, one of which on three occasions (I think it was the same Magpie each time) flew and struck or bounced off the crow's back. The crow stood, holding its victim with its feet, and pecked at it again and again. This went on for about 15 minutes. Then another crow, evidently the Magpie catcher's mate, came to the scene. Even before she alighted, the Magpies around retreated hastily so that when the circle around the crow and its victim re-formed those nearest were about 30ft (approx. 9m) instead of about 12ft (approx. 3.6m) away, as before. At this point many of the Magpies left the scene, returning whence they had come, but about a dozen (12) remained. The second crow walked up to her mate and took a tentative peck at the captive Magpie. The crow holding it was not pleased at this and made an apparently mildly threatening intention movement of pecking towards her. This caused him to lose his balance and the poor Magpie got free. But it could not fly and the crow easily recaptured it and started hacking at it again. The female this time remained near by though at a 'respectful' distance watching proceedings.

At last the Magpie lay inert on its back. Dead as I, and I think the crow also, thought. To my surprise they made no attempt to eat or remove flesh or guts to hide but walked away, the female leading. When they were about 60 yards (approx. 55m) away, the male stopped and looked back. I put my binoculars on the 'corpse' and a second later to my horror, the Magpie moved and struggled over onto its side and tried to stand but fell over again. At once the crow flew back, alighted, jumped onto the Magpie and began hacking at it in apparent fury. This time the Magpie was killed. The crow

made sure, by pausing several times to look back at it as he walked away towards his mate who was about 150 yards (approx. 140m) away.

Though I do not generally think it is usually justifiable to interfere between predator and prey, I should have been tempted to so on this occasion but for the fact that all this took place on private land and within about 60 yards (approx. 55m) of some stables guarded by large dogs apparently kept 'free range'.

On May 30th 2001 I saw two Magpies almost certainly a pair which, the day before, had been seen with a flying juvenile which they were still feeding, fiercely chasing a Carrion Crow. One, to my surprise, landed on its back, grappling it and they fell together among the branches. At this point a second Carrion Crow, presumably the mate of the one attacked, arrived and at once both Magpies fled into denser cover.

On June 12th 2001 I saw a most surprising and to me heart-warming Magpie versus Carrion Crow encounter. I was walking along a path in an open area with scattered clumps of trees, mostly Hawthorns and feral apple trees (not Crab Apples) more or less supporting Dog Roses *Rosa canina*. On my left was an area where (owing to old concrete foundations of war-time buildings) the grass was short but with clumps of taller herbs. Suddenly out of 'the corner' of my left eye I saw a Carrion Crow flying obliquely downwards in the fast, twisting, Sparrowhawk-like flight which they use when trying to catch a Magpie or Jay they have spotted below them in the open.

As I turned my binoculars on it, it caught a Magpie in the air about 4ft (approx. 1.2m) above the ground. As it fell with it to the ground, a second Magpie, that had been almost at the crow's tail, overtook it and alighted on it. For a few seconds there was violent flapping and struggling of which I could not see details owing to clumps of vegetation. Then suddenly both Magpies were free, dodging around the crow, one attacking it from behind (but only pecking at its tail, not jumping on it) whenever it turned to face the other.

Then the crow hopped away fast, got airborne and flew away, one of the Magpies dashing at and 'bouncing off' it as it did so. Then a second crow, still at a distance, flew fast towards the scene. The Magpies at once saw it and flew quickly across in front of me, alighted in the top of a tall Hawthorn and at once went down into it out of my sight. But the crow did not return and the second crow, presumably its mate, turned and flew after it.

Within seconds the two Magpies re-appeared on the very top of the tree and exhibited the white parts of their plumage in typical manner. I had thought at first that the Magpie caught by the crow would have been one of the many juveniles then on the wing but both were adults and, from their behaviour, evidently an established pair.

I was particularly surprised that the Magpie that had been caught by the crow had not fled in panic when it got free but stayed and assisted (consciously or not) its rescuer to frustrate the crow.

In my long life, much of it spent watching birds, I have only seen one other instance of a bird succeeding in 'rescuing' another which had already been caught by a predator. That was a Mallard *Anas platyrhynchos*, in Rothesay, Isle of Bute, which, when a Herring Gull *Larus argentatus* caught one of her ducklings, at once flew 'into its face' and somehow, the actual movements were far too quick for me to see details, though I was within a few yards (metres) of the birds, got it free from the gull.

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SOMETHING TO CROW ABOUT

This year for the first time in more than 50 years, two pairs of Red-billed Choughs *Pyrrhonorax pyrrhonorax* bred successfully on the Cornish coast. The first pair was the wild pair living on the Lizard, which succeeded in raising four young. The second was Paradise Park's Operation Chough pair, which raised three young in a cliff-top aviary. This pair is being encouraged to behave like wild birds and is therefore being kept in almost total isolation, watched over only by CCTV cameras. The aviary has been made as naturalistic as possible, with a small stream, rocks and bare earth, and several places to nest and roost. The pair is also fed a largely naturalistic diet by its volunteer carer Paul Carter. It consists mainly of ants and ant eggs, woodlice, earwigs, centipedes and beetles, which are hidden so that the birds have to search and probe for them. The pair is also provided with insect-rich cowpats from organically farmed cows.

Next year Operation Chough hopes to build more breeding aviaries, near the coast if possible, in which it hopes to produce more chough chicks with the necessary foraging and survival skills to enable them to eventually be released into the wild in Cornwall.

More information can be obtained from Operation Chough, Paradise Park, Hayle, Cornwall TR27 4HB, UK. E-mail:info@chough.org

THE HAND-REARING OF AN UMBRELLABIRD

by Luis J. Ortiz Merry

Introduction

The umbrellabirds are members of the family Cotingidae which is distributed through forests of Central and South America. They belong to the genus *Cephalopterus*, which consists of three species: *C. ornatus*, *C. penduliger* and *C. glabricollis*.



Breeding male Long-wattled Umbrellabird.

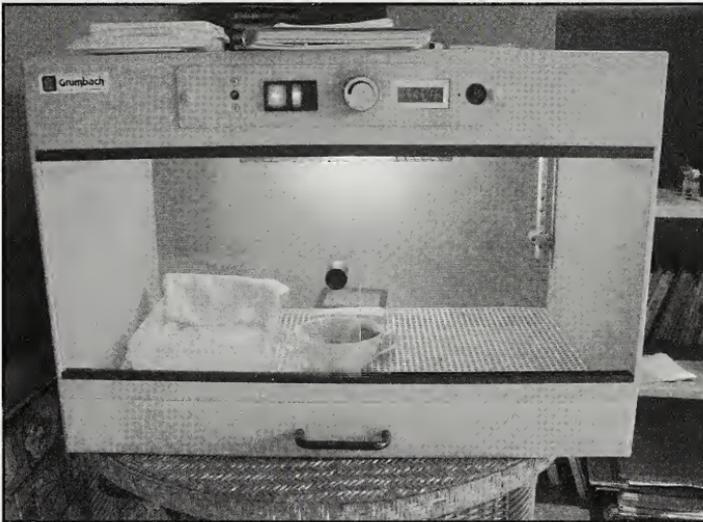
This account refers to the hand-rearing of *C. penduliger*, the Long-wattled Umbrellabird. *C. penduliger* inhabits the lower forested slopes of the western flanks of the Andes of Colombia and Ecuador, in the upper tropical and subtropical zones (mainly 800m - 1,400m (approx. 2,600ft-4,600ft)). Its diet seems to consist mostly of a variety of local fruits, insects (*Orthoptera* and *Coleoptera*) and small vertebrates such as *Anolis* lizards. Here I give a brief description of the hand-rearing protocol, describe the nesting site, incubation, feeding and problems encountered.

Incubation

The nest was located about 3.5m (approx. 12ft) above the ground between the branches of a tree in a mixed species aviary. The female built the nest with fine twigs and it was possible to see the egg through the nest. The egg was incubated by the female for the first 20 days, from the day the egg was first seen in the nest (the exact date the egg was laid could not be determined). On day 20 the egg was removed from the nest and placed in an incubator (Grumbach) set at 37.1°C (98.8°F) and 60% humidity. After five days in the incubator the egg hatched. The chick was covered in beautiful red down.

Hand-rearing protocol

The chick was kept in the incubator for the following eight hours, after which the chick was transferred to a brooder (Grumbach) set at 35°C (95°F) and 60% humidity. Feeding was started 10 hours post hatching. Exact® macaw hand-rearing mix was used to feed the chick from day one to weaning (day 57). From days one to seven only the Exact® mix was fed to the chick.



Brooder in which chick was kept.

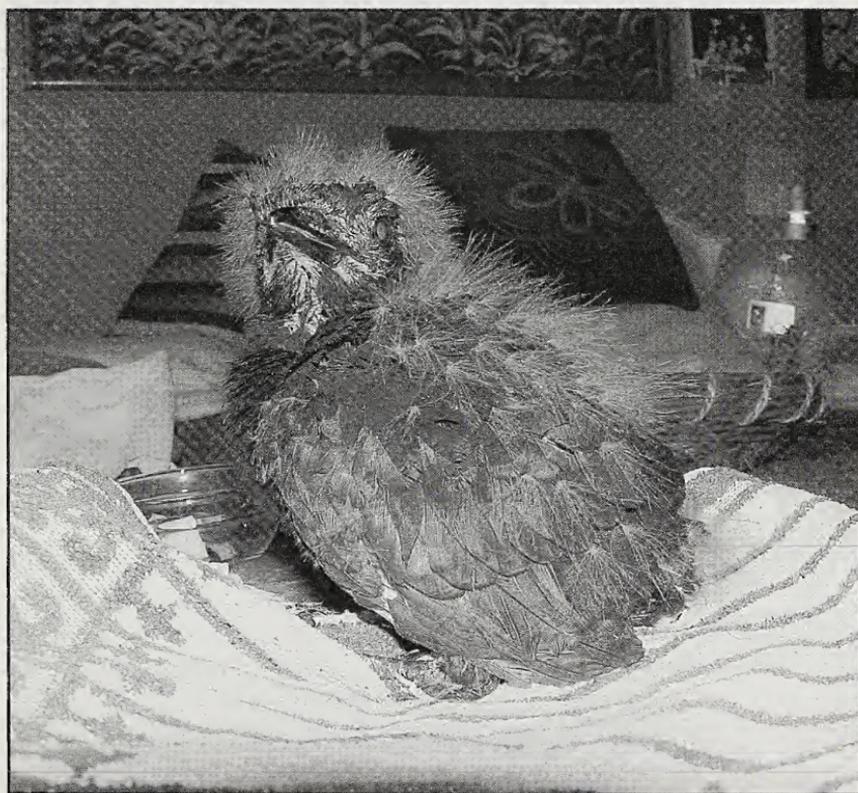
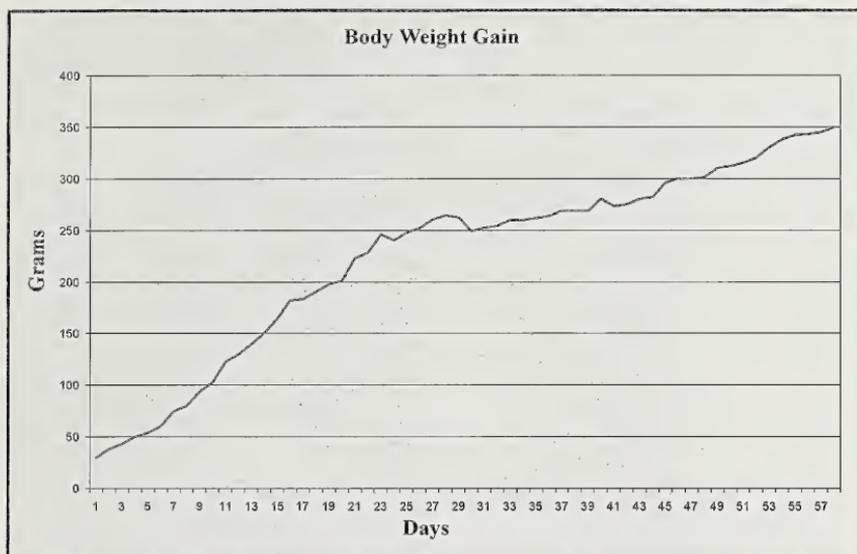
We started with 3/4cc of weaning mix per feed which was increased gradually as the chick grew bigger. For the first three days the chick was fed every 1½ hours over a 20 hour period per day. On day seven we started to introduce solid food, such as small pieces of papaya (pawpaw) and diced mice (pinkies), into the diet. About day 30 the chick would eat up to three pinkies per feed, which over the course of six feeds amounted to a total of up to 18 pinkies per day. Solid foods such as blueberries, figs, papaya and hard-boiled egg were increased gradually throughout that time.



Four days old.

Feeding schedule used for hand-rearing *C. penduliger*.

- Day 1-3 Exact® macaw hand-rearing mix every 1½ hours over 20 hour period per day.
- Day 4-7 Exact® macaw hand-rearing mix every 2 hours over 18 hour period per day.
- Day 8-30 Exact® macaw hand-rearing mix, plus diced pinkies and papaya, every 2 hours over 14 hour period per day.
- Day 31-40 Exact® macaw hand-rearing mix, plus pinkies, papaya, blueberries and figs, six times a day over 12 hour period per day.
- Day 41-50 Exact® macaw hand-rearing mix twice a day, plus free choice of fruits. Three feedings a day over 12 hour period.
- Day 51-57 Exact® macaw hand-rearing mix once in the morning, plus free choice of fruits and Zeigler's® low iron bird of paradise pellets. Two feeds a day.



Twenty-five days old.



After day 48 the bird was moved into a cage within the main aviary.



Fifty days old.

Housing

The chick was kept in the brooder until day 20, during which time the temperature was decreased gradually. Later the chick was set on an artificial nest with a radiant heating lamp which was used at night. On day 35 the chick was moved to a room with several perching places and was kept at a constant temperature of 25°C (77°F). There the bird had plenty of space to jump from perch to perch and practise for its first flight (on day 40). After day 48 the bird was moved into a cage measuring 50cm x 120cm x 60cm (approx. 1ft 6in x 4ft x 2ft) within the main aviary. This was done to encourage the young bird to feed itself without being distracted. Feeding dishes were placed in several parts of the cage and another dish was placed just outside the cage (see photo p.112) so that the young bird could see other birds feeding. As soon as it had learned to feed totally by itself it was moved to a bigger cage (4m high x 4m deep x 3m wide (approx. 13ft high x 13ft deep x 9ft 9in wide)) within the main aviary which contained several perching places and lots of vegetation.

Problems encountered

During the hand-rearing of the chick a few problems were encountered. About day 20 as the chick breathed a clicking sound could be heard when close to it. A few days later it appeared to be having trouble breathing and aspiration pneumonia was suspected. Prophylactic antibiotic and antimicrobial therapy through nebulization was initiated on day 25. This was performed three times a day for 20 minutes for five days with enrofloxacin and aminofilin. Itraconazole was administered orally for seven days. Humidity was raised above 60% and the temperature was kept at approximately 30°C (86°F). Respiratory wheezing disappeared gradually after one week. After this feeding the chick became a hard task, as the chick tended to regurgitate the food after each meal. This was solved by holding the chick's beak closed and in an upright position for a few minutes after it had eaten. These were the only problems encountered during the rearing. Otherwise the chick was alert and playful most of the time and had an enormous appetite and a fast growth rate.

Acknowledgements

Special thanks to Jan van Osch, bird breeder and collector, of the Netherlands, without whose help the above breeding and rearing would not have been possible.

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Two days old.



Eight days old.



Fifteen days old.



Thirty-five days old.

The breeding and rearing described above took place at Centro de Aclimatación Zoológica La Dehesa, Santiago, Chile, where efforts are being made to breed many endangered birds and mammals. It is one of a number of conservation projects initiated by Michel Durand Q. The author of the above account, Luis J. Ortiz Merry, a graduate student of veterinary medicine, was in charge of the incubation, rearing and veterinary treatments.

NOTES FROM CHESTER ZOO - 2003

by Roger Wilkinson

The successful breeding of the Red Bird of Paradise *Paradisaea rubra* in the summer of 2003 was reported in the *Avicultural Magazine* Vol. 110, No.1, pp.20-27 (2004). Other highlights of 2003 included the fledging of our second Great Hornbill *Buceros bicornis*, our second Victoria Crowned Pigeon *Goura victoria* and our first breeding of the White-naped Crane *Grus vipio*. Under the curatorship of Mike Jordan and the care of the bird and parrot teams the collection continues to develop in line with the zoo's overall conservation philosophy and direction to combine good welfare with exciting and educational exhibits.

New arrivals included a pair of Montserrat Orioles *Icterus oberi* received from the Durrell Wildlife Conservation Trust, Jersey Zoo. This is particularly important in that this species is now Critically Endangered and with continuing volcanic eruptions on Montserrat its future in the wild remains uncertain. We also received two female Philippine Cockatoos *Cacatua haematuropygia* to increase to four pairs our holding of this Critically Endangered cockatoo. Plans are well advanced for a new off-show breeding station to hold these and other threatened parrots.

Parrots bred in 2003, all of which were parent-reared, included Red-tailed Amazons *Amazona brasiliensis*, Blue-throated Conures *Pyrrhura cruentata*, Blue-winged Macaws *Propyrrhura maracana*, Derbyan Parakeets *Psittacula derbiana*, Yellow-backed Chattering Lorries *Lorius garrulus flavopalliatu*s and a Blue-eyed Cockatoo *C. ophthalmica*. Stella's Lorikeets *Charmosyna papou* also fledged chicks but unfortunately these did not reach independence. We hold two pairs of Hyacinth Macaws *Anodorhynchus hyacinthinus* and the pair which laid for the first time in 2002 took this an important stage further by hatching a chick in 2003. Whilst this chick failed to survive it advanced our hopes of breeding these magnificent macaws.

Our Great Grey Owls *Strix nebulosa* reared a brood of six chicks which in the late summer and through into the winter offered an impressive display of a group of eight of these huge owls. This was especially the case in the early evenings when their activity made these owls especially engaging. Two Spectacled Owls *Pulsatrix perspicillata*, three White-faced Scops Owls *Otus leucotis* and a Tawny Frogmouth *Podargus strigoides* were also reared. Two Schalow's Turacos *Tauraco schalowi* and two Violet Turacos *Musophaga violacea* were reared and the Blue-winged Kookaburras *Dacelo leachii* fledged three fine youngsters. Three White-collared Kingfishers *Halcyon chloris* (two males and a female) were imported to join the three unpaired females in our Islands in Danger exhibit.

Following their success in rearing a chick earlier in the year, in October the Red Birds of Paradise nested again and hatched another chick that was parent reared to 16 days old. In December a new young male hand-reared at and imported from Bronx Zoo, New York, joined the young male reared at Chester, and both are now housed together in an adjoining aviary to the breeding pair of Red Birds of Paradise. In the same aviary as the pair of Victoria Crowned Pigeons again reared a chick in 2003, the White-naped Pheasant Pigeons *Otidiphaps nobilis aruensis* laid eggs for the first time.

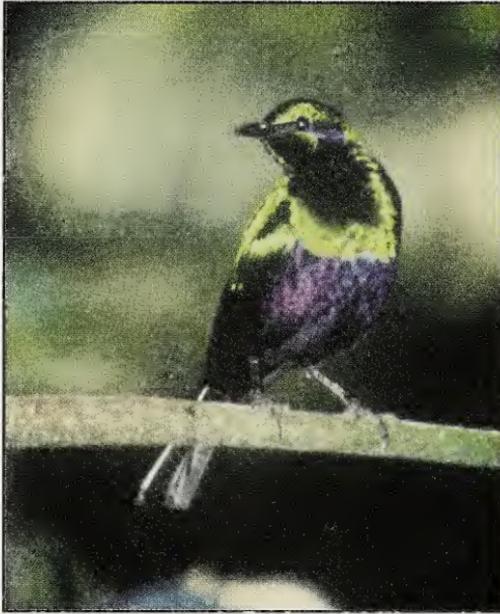
Waldrapp Ibis *Geronticus eremita*, Eurasian Spoonbills *Platalea leucorodia* and Little Egrets *Egretta garzetta* nested in the Europe on the Edge aviary. As a breeding aviary it presents some interesting challenges in terms of managing competition for food between different occupants. Successful rearing of the spoonbills was achieved through the keepers giving supplementary food to the chick in the nest whilst the egrets successfully reared chicks without keeper assistance. The recently paired European Black Vultures *Aegypius monachus* also nested but were unsuccessful in hatching the egg.

We again tried artificial insemination with our White-naped and Wattled Cranes *Bugeranus carunculatus*. Our male White-naped Crane is genetically important and we are encouraged that although he is now at least 55 years of age he continues to produce motile semen. In 2003 artificial insemination resulted in the female White-naped Crane laying two fertile eggs. Unfortunately she is inexperienced as a breeder and did not sit on the eggs. One was incubated by our pair of Red-crowned Cranes *G. japonensis*. The pair, which has been so successful within the managed European Endangered Species Programme (EEP) breeding programme that we have been requested to limit the pair's breeding, are excellent and experienced parents and successfully reared the chick. The second egg was artificially incubated and the chick fostered by a bantam hen and that too was successfully reared.

Waterfowl reared included Black-necked Swans *Cygnus melanocoryphus*, Black-billed Whistling Ducks *Dendrocygna arborea*, Baer's Pochards *Aythya baeri*, Ferruginous Ducks *A. nyroca*, Red-crested Pochards *Netta rufina*, Garganey *Anas querquedula*, Hooded Mergansers *Mergus cucullatus* and White-headed Ducks *Oxyura leucocephala*. Caribbean Flamingos *Phoenicopterus ruber* and Chilean Flamingos *P. chilensis* were again successful, seven Caribbean Flamingos and five Chilean Flamingos being reared. Five Humboldt Penguins *Spheniscus humboldti* were also parent reared.

Many birds were bred in the free flight area of the Tropical Realm. These included Roulroul Partridges *Rollulus roulroul*, Speckled Pigeons *Columba guinea*, Crested Bronzewing Pigeons *Ocyphaps lophotes*, Red-tailed Laughingthrush *Garrulax milnei*, Pekin Robins or Red-billed Leiiothrix *Leiiothrix lutea*, Pope Cardinals *Paroaria dominicana*, Red-eared Bulbul

Pycnonotus jocosus, Asian Glossy Starlings *Aplonis panayensis*, African Pied Starlings *Spreo bicolor*, Emerald Starlings *Coccothraupis iris* and Java Sparrows *Padda oryzivora*. The Java Sparrows were especially prolific with at least 26 youngsters bred in 2003. Birds which bred in aviaries in the Tropical Realm included Jambu Fruit Doves *Ptilinopus jambu* and White-rumped Shamas *Copsychus malabaricus*.



Roger Wilkinson

Emerald Starling.

The pair of Great Hornbills in the Asian Elephant House as in previous years nested early in the year. Mating was observed in mid-January and two eggs were laid in early February. A nest video camera was used to record nesting behaviour. One egg hatched March 23rd whilst the other failed to hatch. The chick was last seen to be fed by the female on March 27th after which there were no further signs of it and the female broke out of the nest on April 7th. Later in the year the female re-entered the nest and began mudding-up again in late September. Two eggs were again laid, the first on October 6th and the second the following day. A single chick hatched on or before November 8th and to our delight fledged on January 11th 2004, making a fitting finale to our 2003 breeding season.

Dr Roger Wilkinson is Head of Conservation & Science, Chester Zoo, Upton-by-Chester, Chester CH2 1LH, UK. Tel:01244 380280/Fax:01244 371273/Website:www.chesterzoo.org

HAND-REARING THE MAURITIUS FODY *Foudia rubra*

by Andrew Owen

Introduction

The Mauritius Fody *Foudia rubra* is one of only six endemic passerine species remaining on the island of Mauritius. Fodies are a divergent group of the family Ploceidae, the weaver birds. The seven species of fody occur on the western Indian Ocean islands of Madagascar, Aldabra, Comores, Rodrigues, Mauritius and the Seychelles. Some species are generalist feeders, eating a variety of food items such as seeds, fruits, insects and nectar. However, the Mauritius Fody has a more specialised diet and feeds mainly on insects and has evolved a brush-tipped tongue for sipping nectar.



Andrew Owen

Male Mauritius Fody hanging upside down in Bottlebrush *Callistemon citrinus*, Black River Gorges National Park.

Classified as Critically Endangered (BirdLife International, 2001), the declining population of the Mauritius Fody is estimated to be between 100-120 pairs (Safford, 1994, 1997; Nichols et al. 2000). Loss of suitable native habitat throughout Mauritius and predation from introduced exotic mammals,

primarily the Black Rat *Rattus rattus* and Crab-eating Macaque *Macaca fascicularis*, have confined it to small areas of upland forest within the Black River Gorges National Park. There a 6 hectare (approx. 14.8 acres) grove of exotic Japanese Cedars *Cryptomeria japonica*, surrounded by and interplanted with native forest, known as Pigeon Wood, is of particular importance to the species. The prickly, sap-laden cedars provide some security for nesting Mauritius Fodies and as they produce no edible fruit are less frequently used by arboreal mammals. Pigeon Wood holds one of the largest concentrations of Mauritius Fodies (nine to 10 pairs) and studies have shown that nesting attempts had considerably higher success (45%) in *C. japonica*, compared to only 6% in other (native and exotic) tree species (Safford, 1994, 1997).

As the Mauritius Fody remains extremely vulnerable, the Mauritian Wildlife Foundation's (MWF's) passerine team has in recent years concentrated its attention on this species and is investigating ways to increase the dwindling population. The planting of additional areas with the non-invasive *C. japonica* and the control or eradication of introduced mammalian predators will play an important role in the long-term survival of the Mauritius Fody. However, other intensive management techniques may have to be implemented in the short to medium period to ensure the survival of this species.

One option would be to harvest or rescue chicks from nests and hand-rear them in captivity. The hand-reared young birds could then be translocated to other locations, such as safe predator-free offshore islands. Some of the hand-reared birds could be established in captivity to act as founder captive breeding stock to produce young birds for future release.

As only two Mauritius Fodies had ever previously been hand-reared and had subsequently died before reaching independence (Smart, 1992), and only a small number had been maintained briefly in captivity prior to translocation, very little was known about the captive husbandry requirements of the Mauritius Fody.

During part of the 2002-2003 breeding season (October-February), a trial was implemented to harvest the nests of Mauritius Fodies, hand-rear the young and establish them in the aviaries of the Gerald Durrell Endemic Wildlife Sanctuary (GDEWS), Black River.

Methods

Chick collection

The MWF passerine field team located fody nests in Pigeon Wood and in adjacent privately owned hunting land outside the national park. Daily nest watches were made and close observations of nest building, incubation and early chick rearing were recorded. Nests designated for harvesting were removed when chicks were estimated to be at least three days of age. A

skilled tree climber collected each complete dome-shaped nest, secured it in a plastic tub and lowered it to the ground on a rope.

The nests were then driven to the Black River aviaries, which were about 45 minutes away. As the chicks were at least three days of age and the nests were heavily lined with the feathers of Pink Pigeons *Nesoenas mayeri* it was thought unnecessary to transport them in a portable incubator. On arrival at the aviaries, the chicks were removed from the nests, weighed and placed in their sibling groups in small plastic tubs lined with tissue paper and part of the nest substrate (fine twigs, grasses and plant rootlets). This material provided a firm, non-slip surface on which the chicks could grip. As Mauritius Fody nests are domed structures, a sheet of paper towelling was placed over each nest bowl, so that the chicks were in what resembled covered, darkened nests.

Brooding

Depending on their estimated age the chicks were placed in one of three forced air Roll-X incubators set at different temperatures. Chicks estimated to be three to four days of age were brooded at a temperature of 34°C (93.2°F). Chicks estimated to be six to seven days of age were placed in an incubator set a degree cooler. At eight to 10 days the temperature was set at 32°C (89.6°F), from 11-14 days it was set at 31°C (87.8°F) and from day 14 until the chicks fledged at 16-18 days it was maintained at 29°C-30°C (84.2°F-86°F). Humidity was maintained at 50%-65% RH throughout the rearing period using shallow trays containing de-ionised water. The incubators were in an air-conditioned room maintained at a temperature of 25°C (77°F).

Feeding

Chicks were given their first feed two hours after collection. By that time they were hungry and eager to feed from tweezers (forceps). Vibrations caused by opening the incubator lid were usually enough to trigger a begging response. Chicks reluctant to beg were stimulated to do so by tapping on the side of the nest bowl.

Food offered comprised of bee larvae, scrambled egg (plain egg, beaten and cooked in a microwave oven for two minutes) and small pieces of papaya. Every second feed this was lightly dusted with Nutrobal multivitamin powder.

Chicks reared later in the season were also fed pureed or finely chopped pieces of pinkie mouse as part of their diet. This food source which was not available during the rearing of the earlier chicks (and is not included in Table 1) replaced bee larvae during alternative feeds.

Twelve feeds per day at 1½ hourly intervals were given to three day old chicks. The first feed each day was given at 6.00am and the last feed at 10.30pm. The intervals between feeds were increased to every two hours

and the number of feeds was gradually decreased as the chicks developed. Days four to six, chicks received 11 feeds a day, days seven to nine they received nine feeds a day, with the last feed at 10.00pm. Between 11-18 days of age or until they fledged, if sooner, chicks receiving eight feeds a day, with the last feed at 9.00pm.

Table 1. Approximate amount of food offered at each feed.

Age (days)	Bee larvae ¹	Egg ²	Papaya ³	Weight of food (grams)
3	3-4	1	1	0.648-1.068
4-5	4-5	1-2	1-2	1.068-1.226
6	5-6	2-3	2-3	1.22-1.73
7-8	6-7	3	3	1.73-1.80
9-10	7-8	3	3	1.80-1.87
11	8	3-4	3	1.87-1.91
12	7-8	3-4	3	1.73-1.91
13-14	6-7	3	3	1.73-1.80
15	6	2-3	2-3	1.29-1.73
16-18	6	2	2	1.73

¹ 1 bee larvae = approx. 0.07g.

² 1 piece egg (approx. 5mm³) = 0.038g.

³ 1 piece papaya (approx. 5mm³) = 0.4g.

Mauritius Fody chicks have an elongated crop that is clearly visible (on the right side of the neck) when full. It was important that the crop was not over-filled and that it had emptied prior to the next feed.

Large faecal sacs were produced by each chick (up to 2g in weight from older chicks), normally after the first morsel of food had been swallowed. Faecal sacs produced by young chicks were removed from the nest after feeding, older chicks were encouraged to defaecate over the edge of the nest onto a piece of tissue paper, thus maintaining a clean environment for the young birds. After feeding, the tweezers were washed and placed in a solution of Virkon S virucidal disinfectant at a dilution rate of 1:100. Tweezers were rinsed prior to the next feed.

Weighing

Chicks were weighed before every second feed using Acculab digital scales which are accurate to 0.1g. Three of the 14 Mauritius Fody chicks were harvested from the wild when they were 13-14 days of age. These birds were initially very nervous and were therefore not put through the additional stress of being weighed.



Seven days old.

Andrew Owen

Chick development

Table 2 shows the chronology of chick development, based on 11 Mauritius Fody chicks from day three (harvesting) to fledging at 16-18 days of age.

Fledging

Chicks fledged at 16-18 days old. At that age they had become very active and were able to fly and perch well. All left the nest at the same time, even though there may have been an age difference between them of up to two days. Once they had left the nest bowl they were removed from the incubator and placed in a wire mesh cage 60cm long x 40cm wide x 40cm high (approx. 2ft long x 1ft 4in wide x 1ft 4in high) furnished with natural branches for perching. The fledging cage was kept in a room maintained at a temperature of 28°C-29°C (82.4°F-84.2°F).

Table 2. Chick development.

Age (days)	Developmental markers
3	Eyes closed; bill pinkish-grey with white gape flanges and red lining inside mouth; pin-feathers under skin on head and emerging on back, wings and belly; legs and feet pink.
4	Dark grey pin-feathers, fine pale grey down.
5	Eyes partially open.
6	Bill becoming dark greyish-horn coloured; pin-feathers emerging on head, dark pin-feathers on upper body and wings, single golden-olive bar on major coverts.
7	Dark pin-feathers over most of body, with gold tips showing on major coverts; legs and feet becoming darker greyish-pink; toes dark grey.
8	Eyes fully open; pale olive-green feathers on back; small tail olive-green.
9	Eyes dark brown; upper mandible greyish, lower mandible pinkish-horn.
10	Rich olive-green feathers emerging on head, on which some fine pale grey downy tufts remain; dark greenish-brown feathers on wings, gold wing bars now visible on major and median coverts; shoulders, back and rump pale olive-green; tail as wings, tipped with gold; golden-olive feathers on throat, breast and belly; vent golden-olive.
11	Eyes rich chestnut-brown; two fine tufts of down remain on head.
13	Cream coloured partial orbital ring above and below eye; creamy-gold superciliary stripe; golden-olive colour on wings turning a paler cream colour, wing bars less distinct and now a cream colour with cream edging to major coverts, secondary and primary feathers.
14	Colouring on underside had darkened slightly from golden-olive to matt greenish-olive.
17-20	Cream-white gape flanges reducing in size.

Weaning

In the fledging cage chicks were offered a shallow dish of insectivorous mixture, to which was added finely chopped scrambled egg, bee larvae and finely chopped fruits such as grape, banana, papaya and apple. In addition, pieces of papaya and mango were spiked on perches in the cage. A shallow dish of water was provided for drinking and bathing.

Within hours of being placed in the cage fledglings were observed pecking at the spiked fruit and two days after being placed in the cage (at 18-20 days old) were observed bathing. Tweezer feeds of bee larvae, egg and papaya were offered every two hours throughout the day, with the last feed being given at 6.00pm. After two days the number of tweezer feeds were reduced to four per day to encourage the chicks to feed themselves. After four to five days in the cage (when aged 20-23 days old) they became reluctant to feed from the tweezers and began picking at the food in the dish. To further encourage this bee larvae were dropped from above into the dish at regular intervals throughout the day.

After nine to 10 days in the cage (when aged 25-28 days old), the chicks were usually self-feeding and independent, although they did still occasionally solicit for food. At that time they also received a tube of artificial nectar (Avesnectar) and, when available, hibiscus flowers and those of the Bottlebrush *Callistemon citrinus*.

Once they were independent the young birds were moved to a larger cage 90cm x 50cm x 50cm (approx. 3ft x 1ft 8in x 1ft 8in) in which they had more room to exercise. During the day they were placed in an outside aviary, in the weaning cage, to acclimatise to the hotter conditions. The cage was covered with a cloth and placed in a shady position to prevent the birds from overheating. At night the cage was returned to the rearing room and a low wattage light was left on overnight.

Outside aviaries

After five to seven days acclimatising to the outside temperatures, the young birds were moved to one of the aviary shelters (2m long x 2m high x 1.5m deep (approx. 6ft 6in long x 6ft 6in high x 5ft deep)), where they were confined for a period of 24-48 hours. Once accustomed to their surroundings and feeding well, the young fodies were given access to an outside aviary. This was 8m long x 3m high x 2.5m wide (approx. 26ft long x 9ft 9in high x 8ft 3in wide), covered with 13mm ($\frac{1}{2}$ in) wire mesh. Each aviary had the back quarter of the roof covered in shade cloth and was connected to a shelter. Each aviary had a substrate of soil, grass and leaf litter and was planted with a number of shrubs and small trees including Bottlebrush, hibiscus, Japanese Cedar, bamboo and Pongam *Pongamia pinnata*. A concrete food platform, surrounded by a shallow water-filled moat, prevented ants from gaining access to the birds' food. At 7.30am the fodies received a dish containing insectivorous mix, egg, grated carrot, finely diced fruit and bee larvae, and pieces of fruit were spiked on branches throughout the aviary. Additional egg, bee larvae or small to medium-sized cockroaches, crickets and leaf-hoppers were given every two hours during the day. A tube of nectar was provided at 2.00pm.



Fifteen days old.

Andrew Owen

Insects form a major part of the fodies' diet and the birds were frequently seen searching among the foliage and leaf litter. Flying insects such as moths and cockroaches were chased and caught on the wing. Large moss covered rotten logs and branches were collected in the national park and placed in the aviaries. These were an immediate focus of attention for the fodies, which climbed up and down the trunks of the logs, probing for arthropods in a manner similar to a nuthatch *Sitta* spp. Night-lights were left on in the aviary shelters to attract night-flying insects into the aviaries.

Morphometric measurements

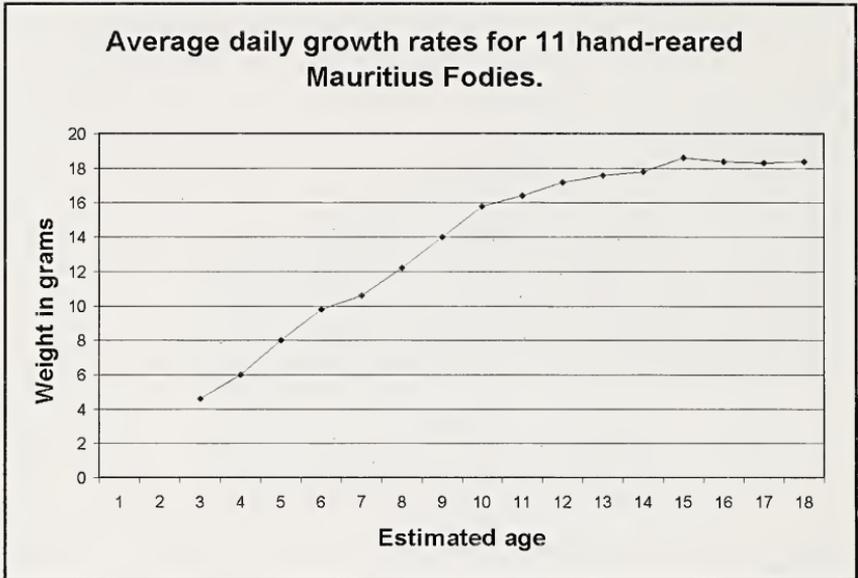
Dial callipers were used to take morphometric measurements (bill, skull, tarsus, wing and tail) of all 14 fodies on January 15th 2003, after they had fledged and were independent.

Table 3. Morphometric measurements (in mm) of 14 hand-reared Mauritius Fodies.

ID	Age (days)	Sex	Bill (gape to tip)	Skull	Tarsus	Wing	Tail
FR0102 CR/L F32110/R	72	F	15.6	31.7	24.0	62.0	34.1
FR0202 DB/L F32111/R	71	M	15.9	31.6	24.7	65.0	37.0
FR0302 YL/L F32112/R	70	M	15.0	30.9	21.5	60.0	36.7
FR0402 WT/L F32113/R	68	M	15.3	30.2	23.8	67.0	37.6
FR0502 RD/L F32114/R	68	M	15.3	31.6	24.4	63.0	37.7
FR0602 DG/L F32115/R	67	F	14.9	31.1	24.7	64.0	33.1
FR0702 MV/L F32116/L	45	F	14.1	30.3	22.5	62.0	31.4
FR0802 PB/L F32117/R	45	F	15.8	31.6	23.5	65.0	31.1
FR0902 OR/L F32118/R	40	F	14.1	32.2	24.1	69.0	35.0
FR1002 PG/L F32119/R	39	F	14.9	30.5	26.0	60.0	33.2
FR1102 GY/L F32120/R	30	M	13.9	28.9	24.6	66.0	37.6
FR1202 PK/L F32121/R	30	M	14.0	29.4	24.2	64.0	34.9
FR1302 BK/L F32122/R	29	M	13.8	28.9	22.6	62.0	34.2
FR1402 RD/R F32123/L	27	F	13.1	28.0	22.3	57.0	29.0

*Andrew Owen*

Shortly after fledging (18 days old).



Discussion

During the four month period October 2002-February 2003, the first stage of the Mauritius Fody recovery programme was initiated, involving intensive management techniques. During this first trial season 100% success was achieved when 14 Mauritius Fodies *F. rubra* were harvested from nests in the wild, hand-reared to independence and established in aviaries at the Gerald Durrell Endemic Wildlife Sanctuary. This was the first time that Mauritius Fodies have been successfully reared to independence. In an earlier attempt in 1992, the two chicks being reared died at an early age.

Plans for future collaborative work between the Durrell Wildlife Conservation Trust and the Mauritius Wildlife Foundation, include perfecting artificial incubation parameters, so that fody eggs rather than nestlings can be harvested from nests in the wild, greatly reducing the risk of nest depredation during the vulnerable incubation period. There are also plans to design hand-rearing and captive husbandry protocols and a trial programme for releasing this species onto the predator free *Ille aux Aigrettes* (Island or Isle of Egrets).

Acknowledgements

Thanks are due to the following people who contributed to the success of the first trial season working with the Mauritius Fody. Richard Switzer

and Andy Cristianacce, the passerine field duo, for their perseverance and vigilance in finding and monitoring nests in all weathers and amidst clouds of biting mosquitos and 'delivering the goods' despite the efforts of troops of macaques and plagues of rats. Tree climbers Anna Reuleux and Jason Malham of the Echo Parakeet Team for getting the precious chicks to the ground. GDEWS aviary staff Freddy, Vanessa, Stephanie, Sarah-Jane, Marie-Michelle and Amanda. Dr Carl Jones who provided valuable insights, pearls of wisdom and friendly chats. Richard and Claudine Gibson for their wonderful hospitality and help with extracting bee larvae and chick feeding.

Durrell Wildlife Conservation Trust supported the project and allowed me leave to carry out this important initial husbandry work on the Mauritius Fody. Particular thanks to David Jeggo, Head of Bird Department at Jersey Zoo, and the late Toni Hickey for 'holding the fort' while I was away. Thanks also to Dr Anna Fiestner for casting her expert eye over the first draft of this paper.

I would like to dedicate this work to the memory of Toni Hickey, whose charm, dedication and humour will be sadly missed.

Products mentioned in the text

Acculab Digital Scales: Acculab, 8 Pheasant Run, Newtown, PA 18940-1819, USA.

Avesnectar: Avesproducts BV, PO. Box 671, 7400 AR Deventer, The Netherlands.

Marsh Farm Roll-X Incubator: Lyon Electric Co., San Diego, California, USA.

Virkon S Virucidal Disinfectant: Antec (Healthcare) Africa Pty. Ltd., PO. Box 1229, Hilton 3245, KwaZulu-Natal, Republic of South Africa.

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Andrew Owen now works at the aviaries at Waddesdon Manor, Waddesdon, Aylesbury, Bucks. HP18 0NJ, UK. They house mostly turacos (eight species including the Great Blue Corythaeola cristata), pheasants and starlings.

MY WOODCOCK STUDY

by B. N. Lowde

(continued from Vol.110, No.2, pp.83-90 (2004))

I had often wondered why in this area Woodcock nest much earlier than in areas a few miles (kilometres) away (as the crow flies) where Dr Graham Heron was doing his study on Woodcock in Whitwell Wood. We had young chicks when he had only just got eggs. This was especially evident when I caught my first ever young Woodcock, which was in mid-February. As it was about three weeks old, I calculated that it must have hatched from an egg laid over the Christmas-New Year period.

Given that the male Woodcock is polygamous and takes no part in the incubation of the eggs or in the rearing of the young, I had often wondered how the female Woodcock manages to successfully hatch her eggs at a time of the year when there is usually frost and snow about. As the Woodcock's nest is only a shallow depression in the ground lined with leaves, it seemed to me a wonder that the female could hatch and rear young in late January-early February.

Another founder member of our club told me that at university he had done his thesis on the geology of the area in which we live and that this area had once been part of a shallow inland sea (the Zechstein Sea), which had laid down a rich deposit of coral, which now takes the form of magnesium limestone. This belt of limestone which varies from six miles to nine miles (approx. 9km-14km) wide along its length, starts at Nottingham and runs diagonally northwards to the coast just south of Newcastle. As our village and the surrounding woodlands are situated on this strip of magnesium limestone, though only near the edge of it, the soil is very rich in worms and other soil invertebrates. In one spadeful of soil we can find approximately 30 worms, whereas if we go to the border of this, which is sandy clay and 'Bunter' sandstone, a spadeful of soil contains no worms.

The conclusions I have reached are that, given that we are situated on a belt of magnesium limestone, with an abundance of food and patches of marshland created by the springs in the woods, plus the fact that we are in a shallow valley and are sheltered from heavier falls of snow by the Pennines and higher ground to the west, Woodcock in this area come into breeding condition extra early - I have since seen them roding on Christmas Day. The favourable conditions enable the female Woodcock to find food quite easily within a reasonable distance of the nest - but how did the eggs hatch successfully when she needed to leave the nest to feed on frosty nights or mornings? I was not to get a possible answer until years later.

The Wood Mouse association

A possible answer came whilst I was examining a Woodcock's nest one March. The eggs had hatched successfully and the female and young had left in the last few days of March. Whilst I was examining the eggshells I noticed that the bottom of the nest was very loose, and on probing gently with my fingers, found to my amazement that underneath the Woodcock's nest was a nest or hibernation chamber of a Wood Mouse *Apodemus sylvaticus*. I lifted the large round nest out of the ground and it immediately became clear to me that the Woodcock had been using the Wood Mouse nest or hibernation chamber to provide a form of central heating! I decided that if by probing around the female Woodcock could find the nest of a Wood Mouse which was just below the surface, she would nest on the top of it and the warmth from below would allow the female Woodcock to leave her eggs for a few minutes to feed, day or night, knowing that the warmth from the Wood Mouse's nest would keep the eggs warm.

Homing ability and feeding

My first insight into the Woodcock's homing ability came about many years ago, when a young Woodcock was brought to me by a 15 years old lad, who had found it in the woods. This was over 20 years ago, before I started my Woodcock study.

Previous to that only one other Woodcock had been brought to me, which I reared successfully. At first I fed it on worms, but at the rate it gobbled them up I soon realised that it would be impossible to keep up the required supply to sustain its appetite and growth. At the time I was keeping members of the crow family and to supplement the worm supply I would add minced ox or sheep's heart. As this worked quite well I decided to try feeding it to the Woodcock, but instead of mincing it I cut it into fine strips so as to resemble worms. I put these in the Woodcock's feeding tray and it ate them along with the worms. Having successfully reared the Woodcock, I released it back into the wild.

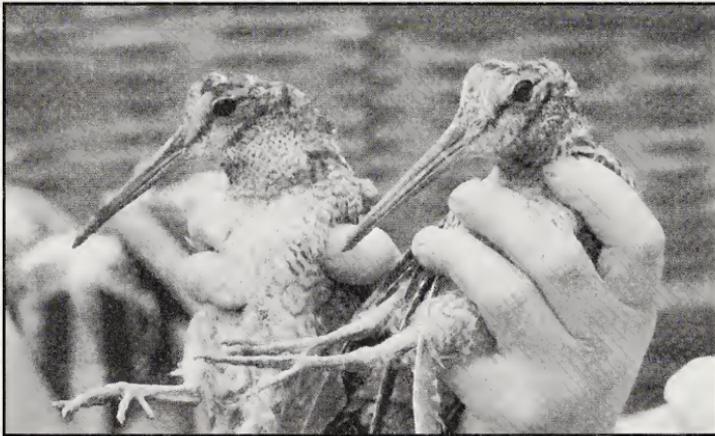
So, when the 15 years old lad brought me the young Woodcock, I already knew how to successfully rear it. I kept it for about a month and then released it into the wood at the bottom of my garden, about 50 yards (approx. 50m) from my gate. In the weeks following I often caught glimpses of it at the edge of the wood and very near my gate. The lad who caught the Woodcock was a keen young naturalist and frequently came to see it (and the other birds I had) while I was rearing it. He spent many happy hours in the wood looking for the Woodcock and many times fetched me to see it amongst the bushes in the wood, just 20 yards - 30 yards (approx. 20m-30m) from my gate.

Some 30 yards - 40 yards (approx. 30m-40m) into the wood is a 'ride'

that runs parallel with my house. On the ride is a damp muddy patch and I would often see the bird standing there. When I approached, it would just squat down and not fly away until I was but a yard or two (approx. 1m-2m) from it. This went on for two to three years, after which I never saw it anymore and assumed an accident had befallen it.

Often seen on my garden path which runs some 10 yards (approx. 10m) down to the back gate, were the droppings (faeces) of Woodcock, which are impossible to mistake for those of any other bird. Large creamy blobs each with a brown spot in the middle, they looked not unlike fried eggs. The brown is actually soil from the worms the birds have eaten.

Over the years, when taking clutches of Woodcock's eggs, after rearing the young I would pick out one I wanted to keep. If it was a female that I wanted, I would choose one that made no sound whatsoever, knowing that if I wanted a male I should choose one that made lots of squeaking sounds. The remaining birds would then be released back into the wild when they were about four to five months of age and fully grown. They would remain in the vicinity of my back gate and I would often see them there in the winter when snow was on the ground, jumping up and down and looking like giant moths in the moonlight.



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Two young Woodcock found in the wild, both with what appears to be malformed skulls and both suffering from partial blindness.

Young Woodcock

Observations on behaviour and coloration

In the first few days after young Woodcock have hatched, I have noticed that if I make or cause a sudden noise, they will as one, lay flat on the ground with their beaks stretched out in front of them. When they are in this position, I am amazed how they resemble coiled snakes. The young are buffy-yellow, with a dark brown area on the back and small spots towards

the rump, along with a distinctively patterned head. I imagine that when seen from above by a predator, perhaps a hawk or Jay *Garrulus glandarius*, these markings instantly send an 'I am poisonous' signal, as many know that wasps and yellow/brown caterpillars are not good to eat. Therefore, young Woodcock have evolved this snake-like patterning to enable them to escape danger.

Changes in coloration

In the *Shooting Times* and other sporting magazines much has been written over the years about differences in the coloration of the Woodcock's plumage. One line of thinking has even suggested that there are two types of Woodcock. What has become obvious to me, having kept them in captivity, is that the Woodcock's coloration changes with the seasons.

The beautiful ivory and brown fern-like patterns on the Woodcock's upperparts can be totally different in colour in the winter than in the spring. At the time of writing (winter), the one that I have in captivity (which is almost a year old), had you seen it three weeks ago would have been hardly recognizable as the same bird. The darker brown markings, previously drab and dull, have now changed to a deep brown-black, with the lighter parts changing in tone to a rusty-red. The lined pattern on the head also changes to the same colouring as the upperparts at this time. The Woodcock's underparts take on a rusty-red appearance.

The darkening of the plumage coincides with the melting of the snow, when all the leaves that fell in the autumn are wet, black and rotting, and affords the Woodcock marvellous camouflage amidst the vegetation of late winter - early spring. As spring starts to arrive, the darker feathers are replaced by tawny-reddish feathers and this seasonal partial moult continues from season to season, so as to afford the best camouflage at all times.

When I appeared on Yorkshire Television with David Bellamy to talk about the early findings of my Woodcock study, he was very interested when I likened the Woodcock's ability to change its coloration to suit each seasonal background, to a chameleon's ability to change its colour to suit its background. He was also interested in the Woodcock's ability to 'shadow' its prey. Whenever I threw a worm onto the floor of the Woodcock's cage, the Woodcock would approach it very slowly, stopping each moment or two and with both feet firmly on the floor, gently move its whole body backwards and forwards, just as a chameleon does when stalking its prey. This I assume is to match the movements of the vegetation as it is moved by the breeze, and makes the Woodcock less conspicuous. I have found that if a sudden shadow is cast, or a sudden movement is made towards a worm on the surface, it will in no time disappear down the nearest hole, whereas a stealthy approach will not startle it.

The Woodcock's bill

Observations on the Woodcock's bill show that the constant probing for food in firmer or harder ground, necessitates the fairly constant renewal of the upper mandible (top only).

In the first nine months of the Woodcock's life, the bill is only strengthened, which starts as a thickening at the top of the upper mandible. This shows as a bulge, lead grey in colour, which moves down between the inner and outer surfaces of the bill and is visible for two to three weeks. After the bird has reached one year of age, for a two to three week period before the regrowth is about to begin, the bird will eat ravenously, as so it is building up its body weight; then as the regrowth begins the bird becomes reasonably quiet and less active and spends more time sitting, as if it is conserving its energy. Throughout this period the bird continues to eat the normal amount of food that I provide. In the wild, what I have described above, usually takes place in early spring, when the worms are near the surface and plenty of surface food is available.



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The adult's bill starts to thicken at the base of the upper mandible.

In the case of the adult bird, the regrowth goes a stage further. It starts off in the same way as that of the younger bird, but the bulge is more pronounced and, in the last week, the bulge will erupt and pieces of the bill will flake off, leaving the new bill underneath. It is rather like what happens when we damage a finger nail and have to wait for the new nail to form underneath and slowly force off the old nail.



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Regrowth stops at the prehensile part of the bill.



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It then starts to flake and peel, revealing new growth of bill.



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Back to normal.

Sonar theory

The Woodcock moves around continually touching the ground with the tip of its bill. Then, it will suddenly stop, push its bill down just below the surface, and then appear to be concentrating deeply. It will then push its bill further into the ground and concentrate again, before finally pushing its bill down to the depth at which it has located its prey. I believe it may be assisted in this by a type of sonar, wherein the vibrations produced by the movement of the prey are received via tactile nerves along the inside surfaces of the upper and lower mandibles. These are then amplified by the bird's ear and are received in the brain. Although I have been studying the Woodcock for over 16 years now and have found out many remarkable things, which are laid out in this account of my study, I feel that certain aspects, such as the sonar theory need more specialised attention than I am able to give.

Bill and tongue actions during feeding

When the Woodcock is probing in the ground, the prehensile section of the bill makes it easier for it to grasp worms. It is further assisted by backward-facing serrations on the surface of the tongue. These lay flat to allow the tongue to slide forward but as it is retracted, rise and help the bird to grip the worm and transport it further back along the bill. The bill is clamped shut as the tongue slides forward, then the pressure is released to allow the bird to transport the worm back along the bill. This action is repeated until the worm is fastened onto the spikes at the back of the tongue (see photo p. 137) and is eventually swallowed. A saliva gland lubricates the tongue to assist its rapid movement within the bill.



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Taken with a 1-5 macro lens, this photo shows the 'worm-hooking spikes' at the back of the Woodcock's tongue. The tongue was taken from from a badly injured Woodcock which died soon after being brought to me. Under magnification I discovered the two smaller spikes between the two larger, outer, hard thorn-like ones. Supple membranes attach the tongue to muscle in the throat.

Saliva gland

When a captive Woodcock is offered food, this will instantly trigger the saliva gland. The gland is situated at the point where the prehensile part of the bill begins. My sketch (p. 138) shows the saliva bubbling out of both sides of the bill. My years of observation have led me to the conclusion that the Woodcock's saliva may have a three-fold purpose: as well as lubricating and aiding the sometimes rapid movement of the tongue, some agent in the saliva may assist in attracting prey and upon coming into contact with the prey (worms) may cause some degree of paralysis and thereby assist the Woodcock in extracting them.

Delousing

Each week I would clean out my Woodcock cages. Having done this I would put in two bucketfuls of freshly dug soil from the wood at the bottom of my garden. The only exception was in the winter, when if the soil was too wet, I would use fine peat.



Sketch showing saliva bubbling out of both sides of the bill.

On one occasion after having put in the soil from the wood and put the Woodcock back into its cage, I noticed that it was behaving in an unusual manner. The Woodcock was excitedly probing in one spot and being an imprinted bird I was able to observe this at very close quarters. I could see that the bird was taking something up in its bill. After a few minutes it would stop taking up whatever it was, and was then seen making movements in its throat and crop. After a while the Woodcock would regurgitate a small pellet. This it would hold in the tip of its bill and run it through the feathers on its back. When I examined the discarded pellets, I discovered they were pellets of clay and stuck to them were minute flat lice of the type that live on many birds.

This behaviour was probably due to the fact that the Woodcock's upper mandible is longer than the lower mandible; also the upper mandible has a hook at the tip to enable the bird to get a grasp on worms and these make it difficult, if not impossible, for Woodcock to remove flat lice in the same way as finches, the Robin *Erithacus rubecula* and other birds, whose bills are ideally adapted for removing minute objects etc. Therefore, the Woodcock has evolved this clever method of getting rid of lice. When I examined the spot where the Woodcock has been excitedly probing, I found a lump of clay to size of a golf ball. It was blue-grey in colour and of a coarser type than most of the clay found in this area.

I have found that captive Woodcock kept indoors, unlike birds in the wild, do not need to bathe as frequently, because they are not out in the elements, constantly getting wet; and in the drier indoor environment there is more chance of them getting lice than if they were out in the wild.

Swimming

At migration time in October-November, a bad time of the year, Woodcock make long journeys over the North Sea from Scandinavia, and this led me to wonder if they have the ability to swim. So, I experimented first with a young Woodcock. I filled my bath with water and put the young Woodcock into the bath and found that it could swim quite well. I next tried an adult Woodcock and this also swam quite successfully as I filmed it with my Super 8 cine camera.

I concluded from these experiments that when migrating from Scandinavia, if due to freak weather Woodcock are forced down onto the sea, they could quite easily float for some considerable time and when the weather clears be able to continue their migration. Being birds that spend so much time in and around wet places they have well oiled feathers. These alone should stop them from sinking and, along with their ability to swim would, I believe, make it quite feasible for them to land on the water - rest - and then continue.

The seeming ability to suppress its scent

Over the years, sportsmen, hunters as well as naturalists, had thought that the Woodcock was able to suppress its scent to avoid detection. This probably came about because dogs, such as spaniels, would appear to pass them without putting them up, and it was only when the hunter almost trod on the bird that it would fly off.

I would like to put forward a possible explanation as to why this should occur. My first insight was when my captive Woodcock would refuse their food when the temperature fell below freezing. They would not start to eat again until the temperature was a reasonable way back above freezing, even though I provided them with fresh food each day. This behaviour could, according to the severity of the weather, last two to three days, after which they would eat ravenously.

This led me to believe that Woodcock must have some kind of inbuilt biological clock which tells them when the ground is too hard and conditions are too bad for them to go looking for food. So, Woodcock sit and possibly go semi-dormant, which would mean that their heartbeat slows down and they live off their existing body fat. In this case the body would produce little or no scent.

I would like to conclude by saying that I believe they are not able to suppress their scent at will, just to avoid detection.

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LETTER TO THE EDITOR

LEG DEFORMITIES IN CHICKS

Thanks to Louise Peat for raising again the issue of leg deformities in chicks (*Avicultural Magazine* Vol.110, No.2, pp.71-75 (2004)). My experience with turacos is that I, like others, have found, as she has, that problems often occur irregularly under apparently unchanged conditions, sometimes affecting one chick in an otherwise healthy brood (see *Breeding the White-cheeked Touraco* by Hewston, *Avicultural Magazine* Vol.90, No.1, pp.209-215 (1974)).

My feeling is that problems with turaco chicks are rarely related to calcium/vitamin D₃ deficiency, but more often, as Louise suggested, to nest substrate. In these cases the condition initially involves perosis, though bone deformities may follow as a result. Another nutritional factor may be vitamin B₂ (riboflavin) deficiency, which can cause a condition known as curly toe paralysis in chickens. Richard Mark Martin mentioned (*Cage & Aviary Birds*, 18th March 1976) that London Zoo successfully treated turaco chicks with B₂ injections, and I am sure there was a reference to this in one of the *Zoological Society of London Annual Reports*, possibly 1969. I supplemented the diet of affected chicks with riboflavin, which I think had some effect. Certainly inward curling toes, whether from B₂ deficiency or other causes, often lead to splayed legs as the feet are unable to grip properly and the legs inevitably slip outwards as the bird tries to move. If the problem is not noticed until the bird has developed splayed legs, with possible associated perosis and bone deformities, the original cause may not be diagnosed.

Thinking back to when I bred turacos, I don't remember encountering any leg problems with turaco chicks while using willow baskets or boxes with carpet, as a base for all nests, and offering breeding pairs a diet of fruit (based on banana, not apple) with a little universal food (usually Bogena) and soaked mynah pellets (Witte Molen). These pellets were taken in quantity by most pairs with chicks.

Louise also mentioned curled toes in pheasants. These are usually thought to be caused by poor incubation or inbreeding, but a fascinating note in a recent *WPA Newsletter*, I think by John Corder, considered the role of stress, with some interesting case histories.

Nigel Hewston

BOOK REVIEWS

CURASSOWS AND RELATED BIRDS

Thirty years ago the first monograph of the family Cracidae - the Chachalacas, Guans and Curassows - was published. The authors, Jean Delacour and Dean Amadon, both now deceased, were ornithologists, with Jean Delacour also of course an aviculturist of great repute and President of the Avicultural Society from 1972-1985. Their monograph, of which only 3,400 copies were printed, quickly became a collector's edition. I remember acquiring a copy and sending it to Jean Delacour to be autographed. The copy went astray and was never found. He sent me a note to insert into another copy, if I could find one. After much searching I found another copy and the note sits between the pages of this treasured first edition.

Next to it on my bookshelf is now a copy of the recently published new second edition. Updated by Josep del Hoyo and Anna Motis, and published by Lynx Edicions in association with the American Museum of Natural History, it has lost none of the charm of the original edition. The family Cracidae is described in detail - from the variations in the trachea to reproduction and there is detailed information on the genera and species. Systematics are discussed and there are descriptions of these birds in the field and in aviculture. As well as all the original drawings and plates by Albert Earl Gilbert, there are new plates by him depicting the chicks of some species and the plates that correspond to the family from the *Handbook of the Birds of the World*.

Some of the birds of this family are common, others are elusive and rare. I can still recall in awe finding in a remote village in south-western Guatemala a Horned Guan *Oreophasis derbianus* - a bird then of almost mythical rarity and beauty. It was to me like encountering a unicorn! The bird was seen in a totally different light by its owners, who kept it with turkeys in a makeshift cage. It had been found as a chick and was being reared to be eaten. I rushed home to write to Delacour about the bird, but sadly he had recently passed away.

This spectacular species adorns the cover of the new edition. At the time that I found this species in Guatemala, my sole source of reference to it was Delacour and Amadon's monograph, which confirmed the bird's rarity. Its future appeared uncertain and it was perhaps doomed to disappear. The new edition, in a separate chapter that updates information in the first edition, sheds more light on this bird, stating: "This guan has been discovered at new localities...(and has) become one of the most studied members of the family." Such information proves the exceptional value of this book and allows the reader to learn about advances that have been made and of the

current status of the various species 30 years after the publication of the original edition.

Cracids, because of their large size, are not suitable for everyone to keep. In my experience they are most popular in Latin American countries, where there are collections that specialise in these birds. Ornithologists and conservationists are interested in the group because these birds are barometers of the environment. "Their large size and tameness doom them to early extirpation once the forest is broken up by burning and slashing and once hunting begins. When they go, other wildlife will soon follow" wrote Amadon. Reading this book brought home to me how important they are as barometers of the environment and how conservation efforts must be doubled in many areas. The book gives the reader a master plan, as it were, as to where efforts need to be focused.

Curassows and Related Birds by Jean Delacour and Dean Amadon, updated by Josep del Hoyo and Anna Motis, is priced £42.50 in the UK.

Derian A.L. Silva Moraton

ARAS

The author of *Aras* (Macaws), Lars Lepperhoff, is a Swiss parrot keeper, well-known in German speaking countries for his enthusiasm for these birds. He has been closely involved with them since childhood and this interest has been carried over into his professional life. Apart from employment at the privately owned breeding facility Hyacinthinus, he is editor of the Swiss magazine *Gefiederter Freund* and parrot breeding expert of the Swiss organisation Exotis Schweiz.

Published in German earlier this year by Ulmer Verlag, *Aras* has 222 pages with 118 colour photographs, 14 sketches and 17 distribution maps. It has 10 chapters which deal with the systematics and status of macaws, with a separate entry for each of the species, their acquisition and keeping as breeding birds, their feeding and health care, as well as a section on potential diseases and illnesses contributed by veterinarian Willi Haefel. The work concludes with a 14 page index and included in this section is a register of species and references.

Although there is a wealth of experience and experiences within the text, the structure of the book is I found very confusing, with scientific information, anecdotes, breeding advice, reports of visits to see macaws in the wild, and charts, all mixed up and interspersed with tips in coloured boxes. There are some errors in the naming of taxa, some spelling errors of author's names and print errors in German characters in some of the tables and charts. There are also errors of fact such as on p.133, on which it is stated that Emperor Rudolph II had a blue macaw in the 16th century, whereas

the illustration in the Bestiaire of Rudolph II shows it to have been a Blue and Yellow Macaw. There are omissions, such as on p.137, where the author fails to mention that the Lear's Macaws at Mulhouse Zoo were transferred to Harry Sissen and were subsequently stolen. There is also an absence of information on important long-standing projects such as the Hyacinthine Macaw project directed by Neiva Guedes in the Pantanal and the Scarlet Macaw project under the leadership of Dr Christopher Vaughan in Costa Rica, both of which have been operating successfully for over a decade.

However the author has succeeded in bringing together the experiences of many macaw keepers and can perhaps provide the reader with advice and information to implement in his or her own macaw aviaries. The six pages of literary references will enable the reader to investigate other sources of information and in the addresses and references section European conservation projects, parrot conservation organisations, magazines and breeding clubs, tourist companies, zoos and bird parks are listed.

The photographic images are excellent. The reviewer knows from experience how difficult it is to get acceptable images of birds in the wild. The effort, patience and dedication required is usually much underestimated. Since no book on parrots will sell well without good photographic material, perhaps photographers of parrots in the wild and enthusiasts such as Karin and Karl-Heinz Lambert, Rosemary Low and Franz Pfeffer should be more prominently acknowledged.

If this book is published in English it will require more than a good translator to convey the author's enthusiasm and knowledge. Also, a re-working of its structure will almost certainly be necessary.

Aras is published in German by Verlag Eugen Ulmer, Wollgrasweg 41, 70599 Stuttgart, Germany. Website: www.ulmer.de.

Tony Pittman

* * *

RARE OPPORTUNITY

Dr Richard Meyer has for sale the *Wildfowl Trust Annual Report* Nos. 1-23, that is from the historic first in 1948-1949 to the twenty-third in 1972, plus assorted leaflets etc. If you are interested in acquiring these you can contact him by Tel: +44 (0)1237 425938/E-mail: richardmeyer@beeb.net or via the Hon. Editor of this magazine.

NEWS AND VIEWS

GOOD YEAR FOR NEW VICE PRESIDENT

At the recent Council Meeting, held on September 18th at Marwell Zoological Park, long-time member Robin Restall was elected a Vice President of the Avicultural Society.

Robin, who lives in Caracas, Venezuela, where he is a Research Associate of the Phelps Ornithological Collection, reports that he has been particularly successful with his birds this year. He has successfully bred the Black-faced Grassquit *Tiaris bicolor* and his Yellow-bellied Seedeaters *Sporophila nigricollis* and Blue-black Grassquits *Volatinia jacarina*, both bred several times. A report on the breeding of the Yellow-bellied Seedeaters will be published shortly and Robin is preparing a report on his breeding of the Blue-black Grassquits. His Sooty Grassquits *T. fuliginosa* reared a youngster to fledging, but it died as the result of accidentally becoming trapped between the nest and the cage. This would have been a world first captive breeding. At the time he wrote (September 22nd), his Ruddy-breasted Seedeaters *S. minuta* had young in the nest.

* * *

BACK FROM THE BRINK

Until very recently Gurney's Pitta *Pitta gurneyi* was thought to be Critically Endangered (with a 50% chance of becoming extinct in five years) with fewer than 20 birds remaining, living in primary lowland rainforest and adjacent mature secondary growth around Khao Nor Chuchi Forest Reserve in southern Thailand. Then a number of pairs were found living at four lowland forest sites in southern Myanmar (formerly Burma), close to where this species had been collected in the past. Now, it has been reported that a larger population, numbering perhaps several hundred pairs, has been discovered in forest adjacent to the proposed Lenya National Park in southern Myanmar.

* * *

FIFTY-FIRST CHICK

San Diego Wild Animal Park's collection of hornbills, already one of the largest in the world, has grown by one following the recent fledging of a female Abyssinian Ground Hornbill *Bucorvus abyssinicus* chick - the 51st hatched at the park. It was back in 1972 that the park received the American Zoo and Aquarium Association's Edward H. Bean Award for having bred the first Abyssinian Ground Hornbill in a zoo. Some of the park's hornbills have lived more than 50 years, including the pair that produced the first chick reared there.

THREAT TO SECOND BALI STARLING

With the demise of the Bali Starling *Leucopsar rothschildi* in the wild (see News & Views Vol.110, No.2, p.91 (2004)), Chris Hibbard, Curator at Bali Bird Park has expressed concern that bird trappers are now turning their attention to the Bali subspecies of the Black-winged Starling *Sturnus melanopterus tertius*. Apparently, although protected under Indonesian law, the population of this bird is being drastically reduced by trapping for the local cage bird market and it is reported that numbers are being shipped to the neighbouring island of Java.

Chris Hibbard has pointed out that unlike with the Bali Starling of which there is a large captive population worldwide, there is no significant captive back-up population of the Bali subspecies of the Black-winged Starling, only single caged specimens held by private individuals. This places it in a potentially more critical situation than the Bali Starling. Therefore he plans to attempt to gather together a number of these birds and establish a breeding population at the Bali Bird Park. Once collected together the birds will be individually identified, DNA-sexed and then housed in a flock, with the aim of letting them establish compatible pairs. Many of these caged birds have been taken from nests in the wild as chicks and hand-reared and show varying signs of imprinting, which may complicate breeding attempts. If behavioural problems occur consideration may be given to using Bali Starlings (of which in May the park held 21) as foster parents.

The above information comes from an item about the Bali Bird Park, Gianyar, Bali, Indonesia, published in *International Zoo News* Vol.51/5 (No.335), pp.368-369, September 2004, which cited as its source the ARAZPA (Australasian Regional Association of Zoological Parks and Aquariums) *Newsletter* No. 62 (May 2004).

LORY MEETING

A special meeting for those interested in lorries and lorikeets is being organised by Rosemary Low. It will take place February 20th 2005 at Shirebrook Village Hall, Park Road, Shirebrook, Derbyshire. Renewed interest in breeding lorries and lorikeets makes it important that breeders should be in touch with each other and have a means of exchanging stock. At the meeting Rosemary will give a talk and slide show on these brush-tongued parrots and those attending will be able to bring birds for sale and exchange. The meeting will commence at noon and is expected to end about 3.30pm. For further information you can telephone Rosemary on 01623 846430. Refreshments will be available and so that everyone can be adequately catered for, Rosemary asks all those planning to attend, to notify her a few days beforehand.



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