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WPA News 56 (1998)

World Pheasant Association

WPA NEWS

No. 56 *May 1998*

The International Newsletter of the World Pheasant Association

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Editor: Derek Bingham

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Forthcoming Events

1998	
4-5 July	The Game Conservancy Scottish Fair, Scone Palace, Scotland
24-26 July	CLA Game Fair, Stratfield Saye, Berkshire
18-20 Sept	WPA Annual Convention, Edinburgh, Scotland
1999	
13-17 Sept	Eighth International Grouse Symposium, Rovaniemi, Finland

Front cover: *Hainan grey peacock-pheasant* *Photo: Yu Hai-yan*

Back cover: *Cover illustration by David Mead from the book* Partridges and francolin: their conservation, breeding and management *by GES Robbins*

The **World Pheasant Association** gratefully acknowledges the support of

BRITISH AIRWAYS
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Chairman's report

Richard Howard

We have, I think, made really good progress towards a new WPA which started to take shape at the excellent weekend we all had at Harewood in February (see report on page 10). Many thanks to Jim and Sarah Irwin-Davies and helpers. It was a huge success, and the forerunner of many such weekends to come. It was open, frank and we all learnt quite a lot about one another.

Following Harewood, the next Council meeting concerned itself primarily with the future of WPA and WPA UK. We have to keep pace with the times and with our own development and expansion. This means clearly identifying our objectives and how we hope to achieve them. It means keeping our structure simple and ensuring good communications with our members. I hope that members will inform us if they feel we are failing in this.

We have been lucky enough to have had two delightful visitors recently - Christine Dranzoa from Uganda, who in an hour or two gave us a good idea of what she is doing mainly concerning francolin in her lovely country. I hope we will be able to give support to her and her ideas. Our second visitor was Dan Brooks from Texas, USA, and we were lucky enough to have his company at the Council meeting. He was, I think, more than a little surprised to see how WPA runs so well on so little. He contributed some really useful comments to this meeting. I was only sorry time did not permit me to take Dan out on a proper birdwatching trip in and around the UK - next time Dan, I promise! Thanks to Nicola for looking after both Christine and Dan during their stay in the UK.

It is most regrettable that I have had to cancel our Joint Charities Clay Pigeon Shoot this year due to lack of support. I have written to all who took part last year in hope that we may get some donations to bridge the funding gap left by this non-event. Our other plans are looking good and we have a busy programme over the next six months or so with The Scottish Fair at Scone, the Bird Fair at Rutland, the CLA Game Fair at Stratfield Saye and the most important, the Convention in Edinburgh.

We are indebted to Keith Chalmers-Watson for taking on the organisation of the convention which, as you can see from the enclosed programme, is a very full and exciting one. Our overseas members will find that Edinburgh is a delightful city and I know that Sally and I are very much looking forward to it.

Finally I would like to draw members attention to the formation of the Jimmy Roberts Memorial Fund, details of which follow on the next page.

The Trustees of the World Pheasant Association (registered charity number 271203) agreed on 14th March to the setting up of a memorial fund to continue in particular the support of schools in the valley below the area we know as 'Pipar' on the edge of the Annapurna Sanctuary. This was Jimmy's original brainchild and in his latter years was dear to his heart. Donations should be sent to the WPA office clearly marked for the Jimmy Roberts Memorial Fund. Please remember that all donations exceeding £250 can be gift aided and tax reclaimed by WPA.

Jimmy Roberts Memorial Fund

In memory of Lieutenant Colonel
J O M Roberts LVO MBE MC
1916-1997
Founder Chairman WPA Nepal 1978-1997
Vice President WPA 1986-1997

This fund is being set up to commemorate the name and continue some of the charitable causes initiated and run by the late Colonel Jimmy Roberts through the World Pheasant Association.

The Fund will initially aim to raise the money for five main objectives:

- Continue to fund the School Master of the Danphe Primary School.
- Continue to fund the guard for the area known as Pipar above the Danphe School where five of Nepal's six Himalayan pheasant species can be found.
- Fund local teams of field workers and ornithologists from WPA's affiliate organisation in Nepal, Bird Conservation Nepal, to survey every two to three years the pheasant populations in the Pipar area. This project could be extended to include the whole of the Annapurna Sanctuary. This work has previously been done by externally-organised parties.
- Raise funds for capital projects connected with the Pipar schools. There are three principle primary schools, one middle school and one high school.
- Raise funds and support for pheasant conservation work elsewhere in Nepal and the Indian subcontinent.

NOTES, NEWS AND EVENTS

The latest on Palas Valley, Pakistan

Since 1991 the Himalayan Jungle Project has been working to safeguard the western tragopan and the valley's biodiversity through an approach that integrates development with conservation. In the March 1997 issue of *World Birdwatch* it was reported that the Pakistan government had approved the successor of the HJP, the Palas Conservation and Development Project, a five-year project to be funded through a 4.8 million ECU grant.

Because of delays in signing of the financing agreement for the project, interim funding for BirdLife's conservation work in the valley ran out in September. To continue the important work on the project, WWF-Pakistan arranged in October 1997 to fund the project for the interim nine months, until the financing agreement is signed. BirdLife has signed a memorandum of understanding with WWF-Pakistan, and are sharing responsibility for management of the project.

Research into mycoplasma

A message from your very first membership secretary: Some of the older WPA members will remember me, then going under the appropriate surname of Peacock. I am now studying to be a vet at Liverpool, and hope that all WPA UK members will respond to this opportunity to partake in and further the important research outlined below.

How you can help the University of Liverpool's research into mycoplasma? Dr Janet Bradbury is doing research into infectious mycoplasma in galliformes but needs examples from different species. If any of your birds die and you think they may have mycoplasma (characterised by swollen gummy eyes, a runny nose and a sweet smell), please could you send them to her? Resources will not stretch to individual reports on birds, but regular updates on progress will appear in future **WPA News**. The ultimate goal is to produce a vaccine against this debilitating and common disease.

Just the head and neck should be sent with your name, address, the date, the species, a brief history, its sex, approximate age and the reference VR98. The samples should be as fresh as possible, unfrozen, and posted by first class from Mondays to Thursdays only, wrapped in kitchen paper, then newspaper, then a polythene bag. If a few ice cubes securely wrapped in a plastic bag are included then this will help to maintain freshness.

Please send to Dr Janet Bradbury BSc, MSc, PhD, Department of Veterinary Pathology, The Jordan Building, University of Liverpool, Leahurst, South Wirrel L64 7TE.

The Cadman Lecture and The Courtier Trophy 1998

Sparsholt College Hampshire is well known for its reliable supply of knowledgeable, practical recruits to game and wildlife management in the UK and abroad. To widen perspectives, The Cadman Lecture is given each year to the students by a national or world authority and named in honour of Arthur Cadman, a much respected name in sporting and conservation circles. On the same occasion The Courtier Trophy is presented for 'Outstanding Services to Wildlife Management' to candidates of high distinction.

This year The Cadman Lecture was delivered by Keith Howman, President of WPA which he co-founded in 1975. Today it is a hugely influential and successful global conservation organisation.

Speaking to an audience of 200 students from game management, wildlife conservation and animal science courses at the College, Keith described the work of WPA specialist groups resulting from the 1982 decision by the International Union for the Conservation of Nature (IUCN) to recognise it with international responsibility for all the world's galliformes.

Using specific well illustrated examples, he showed how enormous practical difficulties were overcome in obtaining reliable facts in the field. Habitat was always the most important initial consideration whether it was in Pakistan or China. Various approaches were used, besides normal field techniques.

Fred Courtier (left) with Keith and Jean Howman and The Courtier Trophy at Sparsholt College.

Education was an essential part of WPA's efforts, especially in involving local people and enabling them to see the lasting value of conserving habitat and its wildlife in their particular part of the world. The Nepal (Pipar) project showed the importance of getting them on your side.

Keith Howman ended by talking about his long association with Sparsholt and the present work of Robert Whale for WPA in Pakistan. Rob had done well in very demanding circumstances and was regarded as a "wonderful example of what a Sparsholt student can do".

Presenting The Courtier Trophy, John Branford (Director of the Fish, Game and Wildlife Management Department at Sparsholt) paid tribute to the enormous value of Keith and Jean Howman's contributions to wildlife, conservation and sport fisheries. It was the first time that a joint award has been made and both had inspired and helped many young people.

Accepting, Keith and Jean stressed the high levels of enthusiasm and commitment which were always necessary for any career in wildlife management, with a readiness to adapt to changes in the future.

Important Cracid Specialist Group Meetings

Daniel M Brooks
Cracid Specialist Group Co-Chair

A Cracid Workshop/CSG meeting was held during the III International Congress on Sustainable Wildlife Management in the Amazon, on 5 December, 1997 in Santa Cruz, Bolivia. The format of discussion was provided by the participants, and ranged from differences in habitats and behaviours among cracids to socio-cultural aspects (*eg* managing cracids for sustainable harvest). Everyone was pleased with the results of this new approach to a CSG meeting/workshop; the results (*Ethics and realities of Cracid conservation: the Latin American perspective*) are in press as a chapter in a book to be edited by Richard Bodmer (Univ Florida) and Bernardo Ortiz-von Halle (IUCN-SSC). There were also several cracid-related abstracts from the paper sessions in Bolivia.

The second meeting will be a Symposium on Biology and Conservation of the Piping guans *Pipile*, co-hosted by the Cracid Specialist Group (CSG) and Cracid Taxon Advisory Group (TAG). *Pipile* as a genus is in a precarious state. The meetings will take place at the North American Ornithological Congress (NAOC) in St Louis, Missouri, and will attempt to formulate Action Plans for endangered *Pipile* taxa.

Report on visit to UK

Daniel M Brooks

I recently travelled to England to enhance projects and activities of the Cracid Specialist Group. This was made possible with a complimentary pass from British Airways Assisting Conservation (BAAC), arranged by

Rod Hall and facilitated by Nicola Chalmers-Watson, World Pheasant Association Administrator.

Nicola picked me up at Gatwick Airport on Thursday, March 12 and arranged the logistical aspects of my visit in a very professional and competent manner, for which I remain indebted to her. For the remainder of the week/weekend, Nicola arranged for me to view several collections, including Birdworld, Child Beale, Keith Howman's, and Michel Klat's. On Saturday, I sat in on a WPA council meeting to provide some input as a Specialist Group representative. These opportunities permitted me to become better acquainted with WPA, through interaction with Keith Howman and Richard Howard, as well as some of the Vice Presidents, Trustees and members, all of whom were extremely kind, gracious and helpful. Some of the important items discussed included the future of WPA, and development of the Cracid Action Plan.

From Monday March 16 - Wednesday March 18 I visited Robert Prys-Jones and staff at the British Museum of Natural History in Tring. Additionally, I was able to meet with Thomas Donegan, a member of an expedition that will be going to search for the elusive *Crax alberti* in extremely remote regions of Colombia this summer.

On Thursday, March 19 I met with David Wege, Nigel Collar and Colin Bibby of BirdLife International in Cambridge to discuss the importance of cracids, their vulnerability to overhunting, and other relevant matters. This meeting proved quite fruitful, as we decided that CSG and BirdLife will collaborate on threatened cracid species accounts for the updated Red Data Book and Cracid Action Plan.

All in all I would have to say it was an outstanding trip. Several important meetings were held, and some important seed money was approved to fund different cracid field projects. Although I have travelled far and wide throughout Latin America, this was my first trip 'over the pond', outside the Americas! England was a lovely country indeed, and I am surprised that it took me this long to visit!

The Mountain peacock-pheasant

A correspondent from Malaysia has reported that the locality where he observed the *P. inopinatum* was inhabited by native aborigines (orang asli), at approximately 3000 - 3500 feet.

"It was in sub-montane habitat with shrubs and vegetation, not as thick as in lowland primary forest, where the *P. malacense* is found. There was a path along the ridge of the hill, which is in places broken down. It was tough going. Only a few people know where these birds are found. Along the way, although we came across some suitable habitat, which the uninitiated might assume would contain *P. inopinatum*, but it never contained the species. Only in a certain area, after crossing similar habitat, some hills and lower altitude

streams, would we come to *P. inopinatum* country. However, within this locality, the birds are plentiful, and sometimes seen in small parties of between five and eight birds, with the birds not being as wary or 'impossible' to observe as *P. malacense*. The birds are not apparently quite easily snared by the local tribes people and are considered better to eat than *P. malacense*".

The tail feathers of the Bulwers pheasant are used by local tribes people as brooms.

First Announcement: Eighth International Grouse Symposium Rovaniemi, Finland 1999

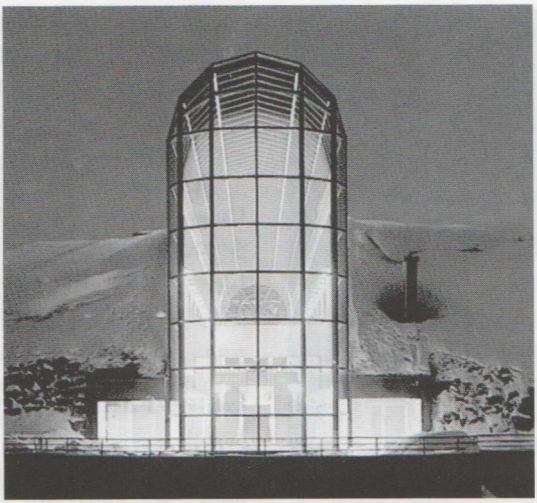
The World Pheasant Association (WPA) cordially invites you to attend the 8th International Grouse Symposium in Rovaniemi, Finland, from 13-17 September 1999. The Symposium is organized by the IUCN/SSC/ BirdLife/WPA Grouse Specialist Group (GSG) in cooperation with the Finnish Game and Fisheries Research Institute and the Arctic Centre (University of Lapland).

The Arctic Centre at the Arktikum provides excellent high-tech facilities for congresses and meetings and, lying in the vicinity of the Arctic Circle, it will also give you an impression of the northern taiga forests and the splendid autumn colours. We will have a field trip to the southernmost fjell areas, and we will also get acquainted with the research made in the northern taiga, as well as the forests themselves.

There are excellent connections from the Finnish capital of Helsinki to Rovaniemi both by air and by train. A variety of hotel rooms will be reserved just in the neighbourhood of the Arktikum. There will be a registration fee including the abstract volume, social events, field trip, banquet and the symposium proceedings.

The overall theme of the 8th Symposium is Grouse Research - for Management and Science. The special themes will include Population dynamics, Behavioural ecology, Landscape ecology and Management applications.

The Scientific Committee will invite some scientists to give plenary presentations. The Committee will also evaluate all the contributed papers, and it will suggest which papers should be given as oral presentations, and which ones will be invited in poster sessions. Abstracts of all the presentations (in English only) must be delivered before the end of 1998. Final manuscripts must be submitted latest during the symposium in Rovaniemi for peer



The Arctic Centre at the Arktikum.

reviewing and for possible publication in *Wildlife Biology*. A proceedings of more than 150 pages (including all the abstracts) will be produced.

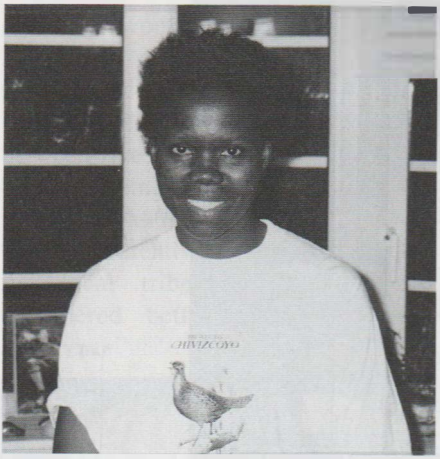
The second announcement will be published and circulated not later than the end of October 1998 including detailed information, registration forms *etc*. Now we ask you to write down the date and place of the symposium. You are also asked to put this accouncement in relevant information desks *etc*. Please, do not hesitate to contact the organizers with practical and/or scientific problems. It is most convenient to use e-mail (harto.linden @rktl.fi) but also the ordinary mail (Prof Harto Lindén, Finnish Game and Fisheries Research Institute, P O Box 6, FIN-00721 Helsinki, Finland) and telefax (+358 205 751 201) are suitable alternatives. Updated information of the symposium will be found from our homepage (Internet: http://www.urova.fi/home/arktinen/grouse.htm).

A brief report of my visit to the UK, February 1998

Christine Dranzoa

Through joint support from The Game Conservancy Trust, World Pheasant Association and British Airways Assisting Conservation, I was able to visit the UK from 11-17 February. The purpose of this visit was to familiarise myself with the activities of The Game Conservancy Trust, share experiences and learn from colleagues working on various aspects of game birds, and to establish links with the various organisations and individuals working in game bird conservation.

I was met in the early hours of 12 February by Dr John Carroll and we headed straight for The Game Conservancy Trust where I spent the next three days meeting various groups of researchers, collecting literature and obtaining more information on the field



Christine Dranzoa

methods (radio telemetry and trapping equipment, insect sampling, faecal sampling, studies on predation and GIS mapping *etc*) and I was very privileged to meet amongst others Dr Dick Potts, Director General of The Game Conservancy Trust. I also spent some time browsing in the Library.

On Sunday 15, I travelled to Reading where Nicola Chalmers-Watson generously looked after me so well. I had a pleasant and interactive meeting with Richard Howard first at his residence and later he showed us the lovely wildlife park. Much of Monday was spent at London Zoo, where I met Simon Tong, Senior Curator, who spared his valuable time to walk us around the various exhibits and discussed all the valuable information on the management of this zoo. Later I was driven to the lovely residence of Keith and Jean Howman.

To me this was a truly important visit into the UK and hopefully will be an opening for us to accomplish our common goals of game bird conservation, and sustainable use for the benefit of present and future generations.

I thank all of you at The Game Conservancy Trust, World Pheasant Association, British Airways Assisting Conservation, BB and London Zoo for making my visit a pleasant one.

Game Fair helpers needed

The CLA Game Fair this year will be held at Stratfield Saye, between Reading and Basingstoke on 24-26 July, and, as in previous years, WPA will have a large stand just off the main arena.

We will again have the live grouse and live pheasant exhibits viewed through one-way glass. We will also have the largest exhibition of sporting and wildlife art ever seen at the Game Fair on one stand. Our main exhibit will be based on one of our longest running projects in Nepal, featuring a recreation of the WPA sponsored schoolroom at the Danphe School which is a part of the project.

We will need several helpers to assist with selling raffle tickets and WPA publications, membership recruitment and also the construction and dismantling of the stand before and after the Fair. All volunteers will be offered a free entry pass if they help for four hours (in two shifts if desired) on any day. If you are able to help, please contact Nicola on 01189 845140.

Harewood Weekend

A weekend of primarily avicultural meetings was organised to take place at Harewood Birdgardens on 7-8 February, which was attended by about 30 WPA members.

Saturday started with the UK GalliTag, including reports on all the UK studbooks and registers. The meeting of this relatively new committee followed after lunch, chaired by Alain Hennache.

There was a little time left in which WPA Chairman, Richard Howard, asked the members present for their opinions on the future of WPA. General discussion followed, and as many of those attending stayed in the Wetherby Jarvis Hotel that night, this informal discussion was allowed to continue during the evening.

The first meeting on Sunday was the WPA-UK AGM. This was followed by a short presentation by Han Assink on the progress of the Indochina project, including several slides of the recent Edwards's pheasant workshop in Vietnam. The next and final meeting was the WPA Conservation Breeding Advisory Committee chaired by Han Assink.

Those who attended the weekend represented private breeders, zoo curators, field scientists and others, from all over the UK and Europe, and the weekend was considered an unqualified success. Many thanks to Jim and Sarah Irwin-Davies for organising the occasion.

Pheasants on stamps

There are some 46 countries that have issued stamps, miniature sheets and covers depicting the pheasant. Most of the species illustrated are carefully produced and are indeed miniature works of art. This collection is represented by 33 different species, as well as junglefowl and peafowl. Most of the countries issuing these stamps are from the Eastern areas of the world, such as China, Thailand, Bhutan, Pakistan, Nepal and Thailand. For instance, the Himalayan monal is depicted on stamps from 24 different countries as also is the great argus pheasant.

However, Edwards's, Swinhoes, koklass, Sclater's monal, Bulwer's, brown eared, Mrs Hume's, cheer and mikado and some others are represented on the stamps of only one country each.

Although the collection is only near completion, it has already taken quite a few years to reach this stage. The fun is in searching and finding each stamp, especially as new ones are issued. See Mr Simpson's advertisement (inside back cover) for more details.

OBITUARY

We were sorry to learn that Richard G Lomar MC, a WPA Life Member since 1977 had died in December. He had kept ornamental pheasants since his boyhood in the 1930s.

MINUTES OF THE 22ND ANNUAL GENERAL MEETING OF THE WORLD PHEASANT ASSOCIATION

held at Beale Park, on 4th October 1997

Present: A total of 13 members were present.

1. Report to Council : See Annual Review 1996/1997

2. The Accounts : A summary of the Accounts and the Treasurer's Annual Report had been printed in **WPA News** 54. These were approved.
Proposed: John Brown *Seconded: John Corder*

3. Election of Members to serve on Council : No nominations had been received for election of new members onto Council.

4. Election of new Vice-Presidents : The following person had agreed to election as a Vice-President, and was duly elected :
Le Sy Thuc (of Vietnam)
Proposed: John Corder *Seconded: Edward Dickinson*

5. Re-election of Vice-Presidents : The following Vice-Presidents had agreed to re-election, and were duly re-elected:
Bertrand des Cleres
Minoo Bandara
Lt Col Jimmy Roberts
Keith Chalmers-Watson
Professor Roger Wheater
Christopher Savage
Proposed: Edward Dickinson *Seconded: Ian Hoggarth*

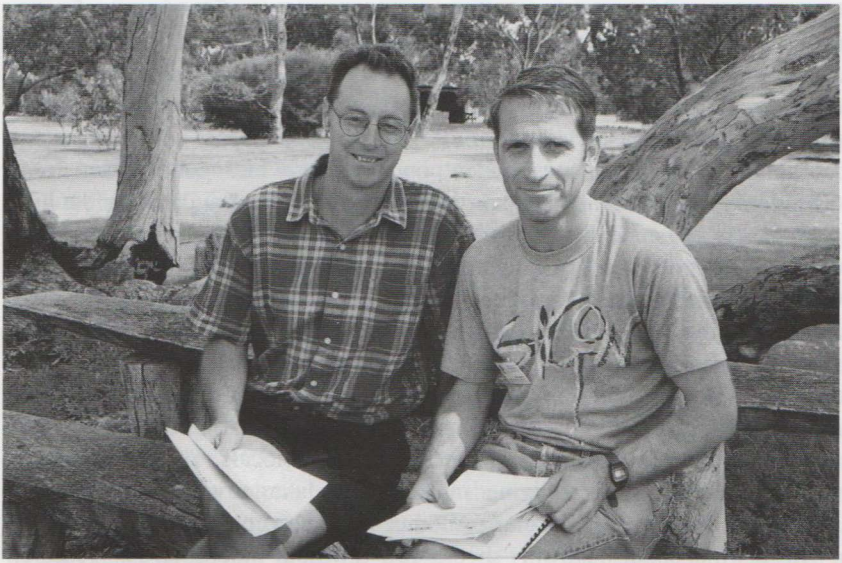
8. Reappointment of Auditor for 1997/98 : It was agreed unanimously that Robert Culver FCA be reappointed for 1997/98.
Proposed: Ian Hoggarth *Seconded: John Brown*

9. Any other business : Members were thanked for attending the meeting, especially as some had just returned from the Malaysia Symposium the week before. There was a general discussion about the success of the Symposium, before the meeting closed at around 12.00.

Report on the Third International Megapode Symposium

Professor David Jenkins

This was held at the Little Desert Lodge, Nhill, Victoria, Australia from 6-8 December 1997. It was organised by Darryl Jones and René Dekker on behalf of the Megapode Specialist Group at a superb venue in the Victorian wheatbelt chosen because of its proximity to fragmented mallee scrub holding breeding megapodes (malleefowl), and with suitable accommodation and lecture facilities. We had a warm welcome from the local community which includes some of Australia's leading amateur megapode conservationists, especially our hosts Whimpey and Maureen Reichelt. An impressive list of sponsors included WPA and the Pheasant and Waterfowl Society of Australia, and one of the strengths of the conference was the opportunity provided for field conservationists to meet aviculturists and zookeepers. The Reichelts have not only created a sanctuary for wildlife in the immediate parkland and scrub surrounding their attractive country inn, but also a major educational facility including an extensive aviary for birds of the dry country. In addition, they have privately protected areas of mallee scrub. Here, Whimpey has cultivated breeding wild malleefowl as personal friends for decades.



All photos: Jean Howman

Darryl Jones (left) and René Dekker who organised the symposium.

The first two megapode conferences at Christchurch in 1990 and at Vienna in 1994 were embryonic staging posts towards the major Third conference which proved itself to be fully fledged. There were 60 participants from nine countries, a civic reception and a big dinner with 90 people attending. Five of the sponsors were wine producers or merchants and the hospitality and quality of the beverages led to great conviviality in the evenings when the entertainments were diverse and enjoyable. The three-day conference was expertly organised as five lecture sessions, each with three to five talks of 30-45 minutes duration, together with a full afternoon open round-table discussion on conserving malleefowl. There was not much time for the conscientious to see the countryside but everyone had an opportunity to watch a male malleefowl helping Whimpey to scratch open its mound so as to create a suitable temperature for the eggs incubating in the compost inside.

The main emphases of the conference were on documenting current studies and on surveys aimed at conserving megapode breeding areas. There were two main themes. One concentrated on the many megapode species in Indonesia and the Pacific islands, and the other predominantly on malleefowl. The urgency of conservation or indeed protection was emphasised in a review of the historical biogeography of megapodes over the last 3000 years; due to human influences, hundreds if not thousands of individual island populations have been lost, with perhaps two-thirds of the original species groups now extinct. The remarkable degree of speciation was illustrated on the small Tongan island of Lifuka where no fewer than four megapode species once occurred on a total area of 11.4km^2. Genetic complexity within a single species is illustrated by current studies of malleefowl in which considerable differences in DNA mitochondrial structure have been found in different parts of Australia, some of which didn't look all that far apart on the map. All too little is known about the genetics of megapodes and translocation should be used with caution as a conservation tool.

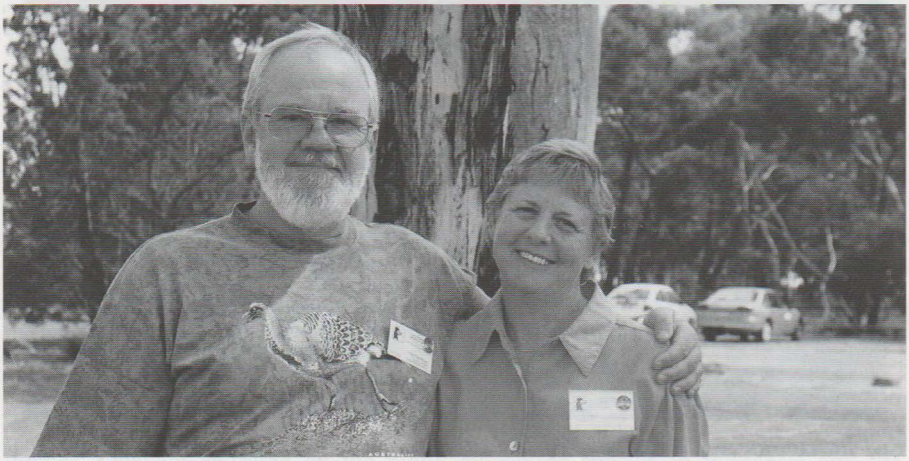
The age structure of the megapoder population provides good reason for a positive outlook. Many megapoders are young and we were stimulated by the high quality of papers by students. Outstanding for its field work in near impossible conditions was a contribution on three sympatric genera of megapodes in Papua New Guinea, studied in an extraordinary tough environment with 7m of rain per annum. There were also specialist papers on acoustics and on patterns of egg-laying in Indonesian species which impressed with the ways data were handled and communicated. The few non-mallee accounts by professional biologists included one on conserving an important megapode nesting area in the Moluccas by purchasing the rights to collect eggs, for partial resale to locals. This initiative was thwarted by an army general living in far away Jakarta who gazumped the conservation bid for commercial gain. Another was an account of the ecology of nesting Nicobar megapodes, the only species found west of Indonesia. This research has succeeded in identifying birds as individuals and is pioneering work on territory

Richard Howard (left) presenting a limited edition bronze sculpture of the WPA symbol inscribed to Whimpey Reichelt in recognition of his conservation work on the malleefowl photographed here with his wife Maureen who made such a major contribution to the success of the symposium.

size and quality, on population structure and on the general ecology of birds using the nesting mounds. Apart from published work on brush-turkeys, which was not discussed at the symposium, this exciting study in the Nicobars is possibly the most ecologically advanced current field programme on megapodes and should be strongly supported.

The several papers on malleefowl centred on conservation but included the history of megapode aviculture at Adelaide's zoo. None was reared for many decades but young have been successfully raised in a number of recent years in an enclosure with a surface area of 60m². In the wild, the species' range has greatly contracted and numbers have declined due to the usual causes - habitat loss from land reclamation, intensive and extensive grazing by domestic livestock, fire, and predation. Nonetheless the species range is still remarkable, even extending into the arid central desert where birds are sparse but presumably secure.

Elsewhere, the species is at risk mainly from farming and fire, and it is to be hoped that remarkable community initiatives encouraging farmers to utilise conservation-friendly practices will succeed. An example was given from a community in Western Australia. As in other cases of declining wildlife, the fox as a predator is thought to be the villain in much of Australia and predation was a main topic. The effect of RCD (rabbit calcivirus disease) was discussed but since rabbits are thought to make up only about 15% of the fox diet, its importance should not be exaggerated. The conclusion was that because foxes do kill them fox control should be part of any recovery plan for malleefowl. However, fox control should not be allowed to become the kingpin of any conservation programme which must



Alan Dennings with his wife Susanne who gave an excellent talk on 'a rural community initiative for the malleefowl' on behalf of the Malleefowl Preservation Group of Western Australia.

concentrate on the restoration of wild habitats. In particular, foxes must not be allowed to become a scapegoat letting farmers off the hook.

Biologists have been studying malleefowl under CSIRO and other programmes for over 40 years. Because the birds are most readily seen at their nest mounds, work has concentrated on mound distribution, both now and historically, and on the ways in which their incubation physiology has adapted to the birds' extraordinary nesting behaviour. Nonetheless to a population ecologist reviewing this symposium it is remarkable that the species is virtually unknown away from the nest. Individual birds may breed for 20 years or more but we know nothing of chick ecology or survival rates (except for a single study in which all marked chicks died), and nothing on population structure or habitat use away from nests or if there is a non-breeding component of the population. And we know next to nothing about non-breeding behaviour or about food or other requirements away from the nesting area.

These gaps are major omissions in a conservation programme, understandable perhaps if this is organised by expeditionary research students working in difficult new habitats far from home, but not in an expensive strategy organised by professional biologists over decades. That said, such gaps in knowledge apply to most galliformes and obviously biologists tend to concentrate on priorities for urgent practical habitat conservation. Moreover, elsewhere these gaps have only recently been filled for a few northern genera. But aspects of the biology of these northern species were thought to be difficult to understand until the birds were intensively studied, and perceived difficulties should not be allowed to discourage conservers of the malleefowl. For other species, so far mostly studied by students, a professional

approach is also necessary as witnessed by the pioneer work of the group led by Darryl Jones on the Australian brush-turkey and the exciting study of Ravi Sankaran and K Sivakumar in the Nicobars. As Darryl told us in his summing up, new physiological arenas are opening for studies of this and a few other megapodes. These opportunities are exciting but should not blind us to the challenge and importance of obtaining basic information on behaviour and population dynamics for most megapode species living in scrub or rainforest.

Difficult as biological conditions may be in the arid Australian scrub and desert, they are much more so in the rainforest environments of Indonesia, particularly when species mostly visit nesting areas at night or only occur on small islands isolated by difficult sea journeys. Small wonder that most studies have been short and done by expeditions or by students. A major conservation problem is to persuade more Indonesians to take an interest in their own fauna and flora. Expeditions of impecunious expatriot students are not always keen to spend their scarce funds on uncertain local counterparts. Other difficulties are political with local governments sometimes appearing to put unnecessary obstacles in the way of well-intentioned visitors. It is increasingly vital that more Indonesian subjects themselves become nature conservationists willing to work in the jungle as an alternative to becoming white-collared workers. This was discussed at the symposium and should be a major topic at the next gathering of megapoders. It is in these political and educational areas that international agencies such as WPA can help the Megapode Specialist Group by influencing governments and by providing funds to help train Indonesian students in ecology in Australian and other universities.

The 3rd International Megapode Symposium provided a focus for discussion of progress on many biological themes as well as how to advance conservation in socio-economic fields. A challenge facing megapoders is how to progress on all these fronts. The first step of uniting workers to think constructively and act cooperatively has been tackled successfully by writing and implementing the first megapode action plan. This symposium was the next step. It was one of the most friendly and constructive 'pheasant' gatherings which I have attended and provides a benchmark of progress. Many gaps in knowledge have been identified. Survey work needs to continue but in particular megapoders need to learn more about their species' ecology and behaviour and to help to promote a more positive conservation-oriented outlook and culture in local and national governments in places where megapodes occur. Indonesia is still one of the biologically richest parts of the world, and the Megapode Specialist Group requires major international help to identify and tackle current socio-economic philosophies which may endanger or stultify conservation strategies. The 3rd Megapode Symposium not only succeeded in bringing together 60 megapoders but also provided building blocks for defining the next steps in the megapode conservation strategy.

Observations on a large flock of greater curassow *Crax rubra* in Belize

Barry Zimmer

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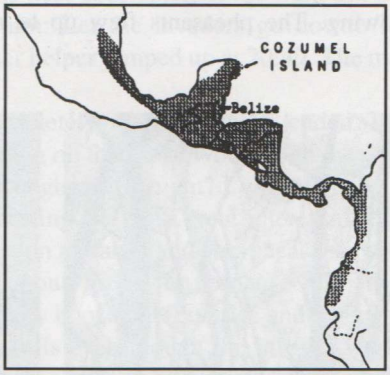
Greater curassow Photo: J Howman

I am a guide for Victor Emanuel Nature Tours, leading trips to Belize regularly - eight times to Chan Chich, and twice each to southern Belize, Crooked Tree, and Ambergris Caye. Typically during a week-long stay at Chan Chich we either miss *C. rubra* completely or see one or two individuals as they cross the road ahead of us. The most I had ever seen previously were seven in one week in early August 1994. Victor Emanuel, members of our birding group and I witnessed an extraordinary greater curassow *Crax rubra* sighting on 26 February 1997 at Laguna Seca, which is approximately 6 km from Chan Chich lodge.

This year on our visit to Laguna Seca we walked the temple tour, an area of undisturbed, seasonal tropical rainforest bordered by a region closer to lake edge with a fair amount of clearing. We spotted our first curassow, a female, on the trail within a few minutes. Shortly thereafter curassows began emerging from trees

overhead and moving to the northwest. We counted 19 individuals (four males, 15 females) fly by us and out of sight in a northwesterly direction. There were several fruiting *Ficus* and breadnut trees in the area. From this point the trail proceeds in a southeasterly direction (opposite to the way the birds flew) and plateaus in the plaza of an old Mayan temple. As we reached the temple we were amazed to see 20 more curassows on the ground at one time moving along the ridge of the upper temple. Many of the birds disappeared behind the temple instantly. Victor moved around the back side so that the group could obtain good views. As he encircled the mound, curassows began leaping up into the trees in amazing numbers (there were at least three more males in this bunch). We had excellent scope views of several (we were only about 30m away) in the trees before they all flew off to the northwest one-by-one.

We are positive that we had a minimum of 39 birds along this trail and some estimated up to 60. I am certain that something in the range of 40-45 individuals would not be an overestimate. I have never seen nor heard of such a concentration of *C. rubra* anywhere before. We returned the next day to the same spot and found no birds. The remainder of the trip we saw only a lone male crossing the road.



Map showing distribution of Greater curassow from southern Tamaulipas, south through Mexico, Central America and northern South America west of the Andes in Colombia and Ecuador. In Mexico the range includes the Yucatan Peninsula and Conzumel Island.

Editors note: Other reports, albeit rare, have noted large gatherings of different species of cracids, but these tend to be older reports, before overhunting and development were serious threats to the family Cracidae. In the case of Crax for example, Cox and Cox (In press. Country report for Bolivia. Pp. 474-481 In: The Cracidae: their Biology and Conservation *[S.D.Strahl, S. Beaujon, D.M. Brooks, A.J. Begazo, G. Sedaghatkish, and F. Olmos Eds.]. Hancock House Publ., WA), note that Naturalists reports from the previous century cited groups up to 100 birds along the banks of the Beni river for species such as C. globulosa. Smaller flock size may have been favored ('selected for' in evolutionary terms) with increased hunting pressure.*

Fight between the Harman's eared-pheasant and magpie

Lu Xin

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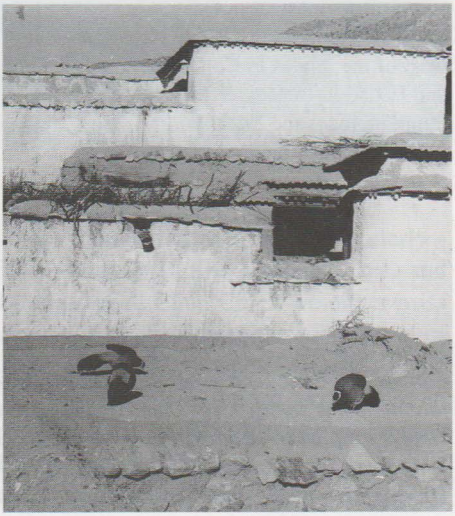
Xiong-se, a magnificent temple where the story took place, is situated at 4300m height near Lhasa, Tibet. Over 300 nuns there devote all their life to Buddha in order to live in the Paradise happily for ever. Also many Harman's eared-pheasants have been accompanying the devout nuns for as long as can be remembered.

In February 1996 I came to the temple to study the pheasant for my doctoral thesis. About 20m away from the temple there was a stream along which a row of willows grew well and had thus became a regular roosting site of the birds. On the top of one of the trees sat a magpie's nest, which was built some years ago. Every night, a few pheasants always liked roosting on the nest. Perhaps this special position made its occupiers feel themselves distinguished from others.

Until recently everything was peaceful. That was until dusk of 18 April when it began snowing. The pheasants flew up to roost earlier than usual. At 20:24, a

At dawn, the snow was so thick that the Harman's eared-pheasant could not leave the roosting tree.



The Harman's eared-pheasants leisurely feed on the roof of the nuns' house.

Photos: Lu Xin

pheasant casually jumped at the magpie nest as it did before. Suddenly, with screams two magpies appeared and threw themselves on the invader. (An idea occurred to me: the host of nest began to breed). The pheasant was immediately flustered and almost fell down. But shortly after coming to realize what happened it calmed itself, for the opponents only were two thin magpies. The pheasant straightened its neck, erected body feathers, spread its tail, angrily opened its eyes, uttered voice like "ge...ge..." to frighten the magpies. They, in the meantime, were quickly changing their positions between branches around the nest in order to find one from which they could take advantage at attacking the pheasant. When they did so, they also gave a kind of specially husky calls. With the magpies' shifting the pheasant had to turn its body so that its strong bill kept facing the raging attackers. At 20:38, one entered into the nest, the other, I did not know why, was left and continued to struggle against the pheasant. At 20:42, the magpie launched a vigorous assault. It succeeded in standing on its own nest and the invader was forced to the edge of the nest. (Good! Try again! I encouraged the magpie at heart). But only in several seconds, the pheasant recaptured the position. A minute later, another assault of the magpie was beaten back. Snowflakes flew with wind over the valley. It was dark and dark. But both sides refused to give in and the fight went on.

At 20:45 a pheasant jumped on the nest and joined in the fight but the magpie still made every effort to attain its aim: Let the invaders go down! The helper withdrew from the nest shortly. Another helper jumped up at 20:49. The magpie also was not frightened away.

Until 20:52 it was getting dark completely, the fight finally ended. The magpie went away and the pheasant kept standing on the nest. (Would both the magpies and the pheasants have a good sleeping throughout the night? I wondered).

Next dusk, when I came to the roosting site with great interest, I found to my surprise a magpie was guarding its nest on a branch and two pheasants were staying on lower branches and hesitating about going up because the magpie was threatening them. When a pheasant finally boosted its courage and made its way, the magpie flew around with frightening calls even though the invader was so strong and powerful. Meanwhile an alarming voice came out from the nest. As a result two pheasants had to perch on branches about 2m away from the nest throughout the night. I visited the roosting sites 57 times, almost every dusk from 18 April to 26 June. 13 fights were noted in different dates and the other 44 nights were peaceful.

Then who was stronger or winner? Statistics of 7 out of 13 fights since 18 April in which the nest was a battlefield could tell the answer. Firstly I give my rules as referee of the score. If the magpie succeeds in driving away all the pheasants from its nest, the bird will get one point; contrarily one point will be added to the pheasant that kept roosting on the nest. Sometimes the magpie forced one of the pheasants to fall down, though the nest was still occupied by other one, I would like to put 0.2 point to the thin defender in this case!

A list of fights between the Harman's eared-pheasant and the magpie

Date	No of pheasant	No of magpie	Duration (min)	Score-board	
				pheasant	magpie
18 April	1+1+1	2-1	10(20:34-20:54)	1	0.2
6 May	1	1	1(20:51-20:52)	0	1
11 May	1+1	1	9(20:57-21:06)	1	0.2
12 May	1	1	8(20:59-21:07)	1	0
20 May	1	1	1(21:07-21:08)	1	0
24 May	1	1	1(21:07-21:08)	0	1
25 May	1	1	1(21:06-21:07)	0	1
Final score				4.0	3.4

The list shows that victory went to either the pheasant or the magpie in different dates. Whether the magpie won seemed to depend on the rank of a pheasant in the group instead of duration of the fighting. On 12 May, for example, the opponent was the most dominant male in the group of the pheasants. The attack of the magpie was more violent than usually and the bird even climbed up to the nest and peeked at the pheasant. The fight lasted eight minutes but the magpie failed in its attempt. When the opponents of 24 and 25 May were a sub-adult male and a lowest-grade male, respectively, the magpie got the victory after less than one minute each time. If the pheasant was not in a state of preparedness, the magpie would easily win.

On 6 May, no sooner had a pheasant got on the nest than a magpie rushed out from the nest hole and gave a powerful attack. The pheasant, which had relaxed probably due to six continuously peaceful days, dropped down at once. Let me look at the final score: 4.0 to 3.4, the magpie lost the game with only 0.6 point less than the pheasant.

Is the result fair? I do not think so. Six fights that took place in the tree crown at which the nest was located or in the near trees' crowns were recorded on 19, 20, 28 April, 16 May and 5, 8 June, respectively. As a result, as happened on 19 April, the pheasant did not dare to climb up farther to the magpie's nest. Six points, I think, should be awarded to the magpie. Again, 29 out of the 44 peaceful nights observed, at which the pheasant had to roost on the branches near the nest and the left 15 nights at which there were no pheasants on the crown. Though there were no fight at those nights, the fact without any pheasant on the nest and even in the crown of the tree indicated the result of the magpie's effort. Moreover, compared to the pheasant, the magpie was so thin, lonely and even poor. So I considered the magpie was stronger and also the winner. Why could the small one gain an advantage over the big one ? Maybe what it did was just! *[Or maybe they have a more vicious nature! Ed.]*

A preliminary study of the habitat use and behaviour of green peafowl in spring in China

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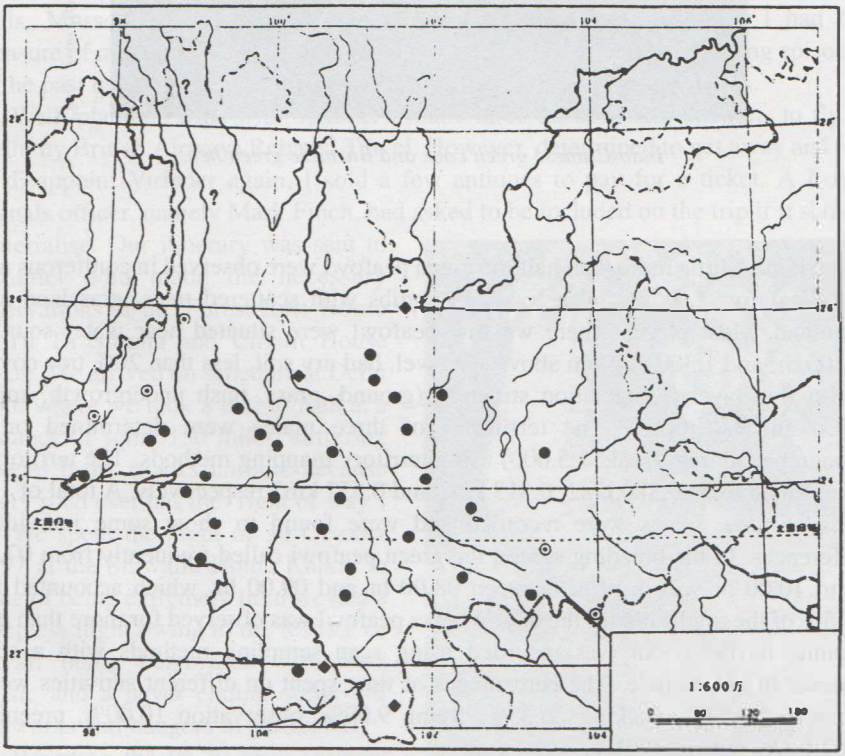
During a population census of green peafowl *Pavo muticus imperator* in Jingdong County, Yunnan Province in spring 1995 we also studied the pheasant's habitats and

Range of green peafowl in China



⊙ regions in which green peafowl occured before the middle of 1980s

● regions in which green peafowl occurs after the middle of 1980s

● regions in which green peafowl occurs before and after the middle of 1980s

? regions in which local people said green peafowl occurs but need further confirmation

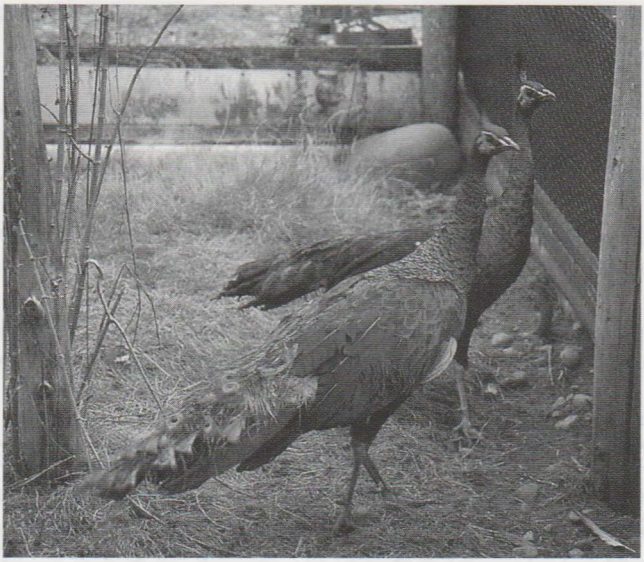


Photo: Jean Howman

Indo-Chinese green cock and Burmese green hen.

behaviour. A little more than half the green peafowl were observed in coniferous and broadleaf forest. It was also found in shrubs with scattered trees, grassland and farmland. Most places where we saw peafowl were situated near water sources (<100 m) and 1,300-1,400m above sea level, had dry soil, less than 20% tree cover, and a five layered vegetation structure (ground, grass, bush undergrowth, small trees, and tall trees). The territories of three males were determined on a topographical map (scale 1:5,000) using territory mapping methods. The territories were found to be 0.380 km2, 0.313 km2 and 0.557 km2 respectively. A total of 144 calls of three males were recorded and were found to show some individual differences. In the breeding season the green peafowl called frequently from 07.00 hr to 10.00 hr with a peak between 08.00 hr and 09.00 hr, which accounted for 37.5% of the total calls for the day. When a peafowl was observed for more than one minute, its behaviour was recorded using scan sampling methods with a scan interval of one minute. The percentages of time spent on different activities were: foraging 51.82%, walking 26.35%, flying 9.09%, observation 10.00%, preening 1.82% and dusting 0.91%.

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A natural cheer pheasant stronghold

Mike Harrison

I visited the Shimla Hills situated in the lower regions of the Western Himalayas during the second week of November 1994. I trekked over several favourite haunts, making the village of Basaal my prime target to meet one of my late Father's servants. Unfortunately he had died many years ago, but his son gave me much of the information I wanted about the cheer pheasant and other game in the area. He was pleased to confirm that the cheer continued to flourish below the precipitous cliffs.

Since my retirement in 1991, I have had a constant desire to re-visit the Shimla Hills, Mussoorie and the Shiwalik Range. Through Keith Howman I had the pleasure of meeting Dr Virinder Sharma at Ashmere. Aware of my shooting episodes in the past he was keen to accompany me should I visit the Shimla Hills.

Well, planning trips with Virinder I made three unsuccessful attempts to fly to Delhi by British Airways Rebated Travel. However, determined to get away and not to disappoint Virinder again, I sold a few antiques to pay for a ticket. A Royal Signals officer, namely Mark Finch, had asked to be included on the trip if it should materialise. Our itinerary was sent to Virinder who made the necessary reservations at the Forest Rest House at Tu Tu Shimla and Circuit House Solan. We arrived on schedule at Delhi from where we took a taxi to Kalka, a distance of some 150 miles, suffering several heart attacks enroute because every road user has the 'right of way'!

We spent the night of 30 October 1997 at the Shiwalik Hotel, Kalka. In spite of being extremely tired we had a sleepless night owing to the festival of Divali being celebrated with loud music and a never ending supply of fireworks and bangers in particular!

Boarding the 06.20 train (narrow gauge Kalka Shimla Railway), we climbed steadily through some magnificent mountain scenery, passing

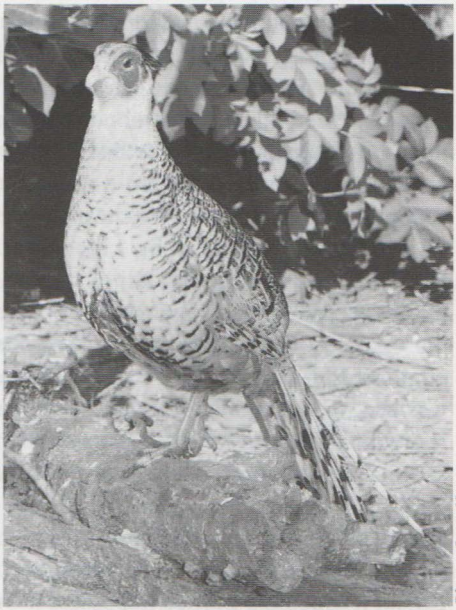

Photo: Jean Howman

cock cheer pheasant

through 103 tunnels, the longest being the famous Borag tunnel, just under a mile in length. Before the diesel engine was invented and introduced on this railway, the old steam engine was spectacular, though passing through the tunnels, especially the long ones, caused some discomfort despite the shutters being drawn down. The train was running about one and a half hours late and we were concerned about Virinder meeting us. Entering Shimla Station at 15.00, there he stood on the platform awaiting our arrival. He drove us up a narrow winding track to the top of a hill where the Forest Rest House was situated. We spent two comfortable days at this place which was densely forested and believed to contain quite a few coveys of kalij pheasants.

Solan, like most of the hill stations, had changed beyond recognition. Anyway, on 3 November 1997, according to plan, four of us set off trekking. (Virinder having brought his son Kamal along to be initiated into outdoor life.) I led the way, my memory going back 60 years when as a kid I accompanied by Dad and elder brothers out shooting over this very same territory, even drinking water from an original spring.

Moving just off the track to a vantage point, I said to Virinder "This area above us which adjoins the wide valley in front, provided us with some of the best kalij shoots in our time". I also pointed out the hills near the town of Sabathu where in 1946 a man-eating panther terrorised the villagers until it was eventually shot by my late eldest brother Ainsworth. While I was giving a running commentary some village kids on their way to the Basaal Mela (festival) collecting around asking questions, mostly worldwide affairs. In turn Virinder took the initiative to question them about wildlife in the surrounding area with emphasis on pheasants. They hadn't a clue. When asked about panther, the reply was choruslike. "Yes, lots of them in the Solan Park." We had already seen the Solar Park, an apology for one. However, the park comprised a murkey cemented pond, an elaborate marble type canopy, stone tables with benches, and yes, panthers, but statues of them!

Moving up away from the kids we had hardly climbed 100 yards or so when we found evidence of a cock kalij having been killed. Its feathers lay strewn about the bushes. I can recollect having seen leopard cat and martens throughout these hills so presumably the pheasant was stalked and killed by either. By early afternoon we climbed down to the village of Basaal stopping near a spring for a lunch break. It was here that a local walked up the hill carrying in two parts a 12 bore single barrel shotgun. Virinder asked him as to whether he was going shooting. He replied in the affirmative, mentioning cheer and even quoting the weight of a male as 1.5 kgs. Suddenly, he became suspicious of the questioning and moved up in top gear towards the steep mountainside, the habitat of the cheer pheasant.

In my past experience, I had developed a fair knowledge of village life. Any such person if granted a licence to possess a weapon was only to proud to conspicuously display it. In this case, I had my doubts. The weapon was uncoupled and partially

concealed, enough to prevent identification by a layman. Whatever, he was out for a kill at a waterhole or more likely when roosting. One thing is certain, they never shoot unless the quarry is worth the cartridge which rules out shooting on the wing. We mingled amongst the folk at the festival where I was recognised by a dignitary who claimed he knew me. According to him we played football together at Chambaghat, and that I often accompanied Dad shooting in this village area. To Virinder and I, this was good news. He really gave us an intrinsic account of the wildlife. He believed there were at least 100 cheer pheasants, plenty of goral (mountain sheep) and six panthers amongst the cliffs and two below the village. He also mentioned the fact that martens were responsible for killing quite a few cheer, and the panthers were taking a heavy toll of goral. Looking up towards the cliffs, whirling vultures indicated a kill, a convincing and familiar sight for me.

It did occur to me that this natural stronghold has the potential to be immensely augmented by exporting and incubating cheer eggs, then releasing them in their natural environment to strengthen the strain of those in this area from day one. With proper organisation, the cheer population in the Basaal Cliffs can become the pride of the conservationist and the envy of the shooting fraternity. If the project got off the ground, and the cheer population really multiply, then perhaps their shooting may be legalised on very stringent conditions. For example on a permit system, two birds per permit and no more than ten permits to be issued on the first come first served basis.

Any sportsman in pursuit of cheer pheasant in this vast area will have to be 100% fit to see, let alone get a shot at them unless with an experienced hand. To be fair, its a lot to ask of someone to undergo the expense for the sake of a couple of shots being fired. Therefore, to attract the fit and ardent sportsman, the permit could include the shooting of kalij pheasants which are widespread, but difficult to shoot, so as a rough guide, half a dozen birds bagged over a week's shooting through steep wooded terrain would be something to write home about!

I'm no longer a shooting person, nonetheless, I don't begrudge those who indulge in the sport. After all, had it not been for them to encourage farmers/gamekeepers to incubate ring necked pheasant eggs, albeit to be shot later, perhaps this species would have been on the endangered list. A similar programme may help to increase the numbers of cheer pheasants in the wild. Whatever the consensus of opinion about the shooting of cheer by legitimate means, I strongly recommend that measures be taken sooner than later to designate the area above the village of Basaal, Himachal Pradesh, as a sanctuary for cheer pheasants.

Note: Jack Russell owners and those who have enjoyed Mike Harrison's sporting reminiscences in India may be interested in his new little book Now there is one which describes the worries and the joys that Becky, Cyndy and Toby have brought to the author. Published by Minerva Press and price £3.99.

Recommendations for diets of captive pheasants, based on information from diets of wild birds

Christine Sheppard, Ellen Dierenfeld and Martin Burnett

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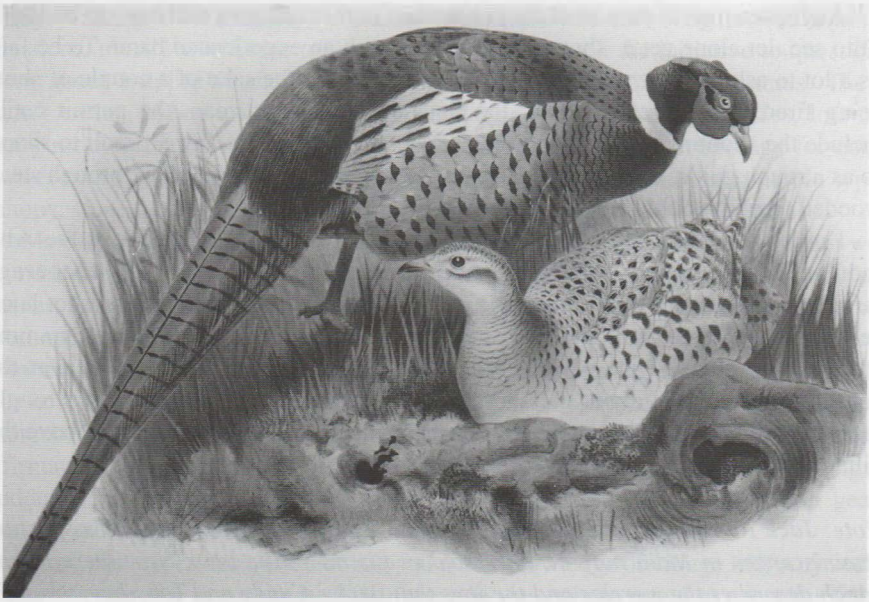
Introduction

Diet recommendations for pheasants generally assume that species are similar. However, within a group of birds, even a relatively homogeneous one, diets can vary significantly. Hornbills, for example, range from highly carnivorous to highly frugivorous (Kemp 1980, Leighton, 1982, Poonswad, 1983), but discussions of captive diets usually refer to 'the hornbill diet', as though all species were identical. While extensive studies have defined comparative nutrient requirements in mammalian groups like the ruminants (Cheeke 1991), little analogous work has been completed for avian taxa. The goal of our study was to determine whether diets of pheasant species vary in basic composition. Because protein is among the most commonly evaluated nutrients in avian diets, we focused on this first, as an indicator of general diet diversity.



Limited research has been conducted on ring-necked pheasants.

Nutrient standards for virtually all captive avian diets are based on studies of domestic poultry (see, for example, Ullrey *et al.* 1991). Limited research has been conducted on ring-necked pheasant (Dalke 1937, McAtee 1945, Edminster 1954) and this, in addition to work on chickens and turkeys has been used to establish dietary-guidelines for the pheasants as a group (National Research Council 1994, Woodard *et al.* 1993). Typical recommendations for dietary protein for an adult pheasant range from 16 to 20% crude protein.

Methods

We reviewed published reports of wild pheasant diets. We also examined tags from specimens in the skin collection at the American Museum of Natural History, for lists of crop contents. Information was compiled for 42 species, although the number of references and the amount of information per species varied considerably. Some references were detailed and specific, others very general.

For each pheasant species, all items consumed were scored as primary (P) or secondary (S). Primary sources comprise items eaten regularly, throughout the year, by adult birds; a single species can have more than one primary food type. Secondary sources are those consumed either seasonally or only occasionally. Of necessity, scoring was subjective. Obviously, these categories can only be used as an indication of the importance of each item in the diet; the actual proportion of each item cannot be calculated. Chick diets were not included.

We rated all food types according to levels of important nutrients (Table 1). For analyses of actual foods consumed by free-ranging pheasants, we used some data from the field (Peoples *et al.* 1994, Robel *et al.* 1995, Ramos-Elorduy *et al.* 1997) plus extrapolation from similar foods analysed for human (Watt and Merrill 1975) and agricultural uses (National Research Council 1982), as well as an extensive database of natural foods (WCS Department of Nutrition, unpublished data).

For the first step of the analysis, we grouped items with similar macro-nutrient composition. Food categories included INSECTS (insects/spiders; high protein, low calcium), SEEDS (seeds/nuts; moderate protein, low calcium), LEAVES (leaves/grass/shoots/moss; moderate to high protein, high calcium), FRUIT (fruits/berries; low protein, low calcium), MOLLUSKS (mollusks, crustaceans, worms: high protein, high calcium). If any item within a group was a primary source for a pheasant species, that group was scored as primary.

Results and Discussion

INSECTS (high protein) are a primary source for about half the species (Group I, table 2). Group I species divided into Group IA, which also has LEAVES and SEEDS as primary foods, and Group IB, species which are largely insectivorous. The remaining species, (Group II) used LEAVES (moderate to high protein) as their major source of protein. Group II could also be subdivided into Groups IIA, species

which had SEEDS and FRUITS as primary foods, in addition to LEAVES, and Group IIB, which is largely folivorous. We conclude that these four groups of pheasants represent a spectrum of protein requirement, increasing from about 20% to about 40%.

INSECTS and LEAVES differ not only in protein and calcium levels but also, potentially, in digestibility. Insect meals have been shown to be highly digestible, (Ramos-Elorduy *et al.* 1997). The fibrous constituents of green plants, however, may require extensive microbial fermentation in the gastrointestinal tract. The galliformes in general have large intestinal caecae, compared to other orders. These organs are sites of microbial digestion and protein absorption (Welty 1963), as well as intestinal reflux (Robbins 1993). Pheasant species with plant-based diets may have a more developed gut architecture, compared to those with insect-based diets, although their is some plasticity of intestinal morphology with diet composition (Leopold 1953, Karasov 1996).

35% protein is considered necessary for crestless fireback pheasants.

Pheasants from different diet groups are often fed identical pelleted rations. Protein sources in pellets vary, but are largely plant based in the US, from vertebrate by-products in Europe. Differences in digestive efficiency may be important to explore, especially if insect specialists are inefficient at digesting plant materials.

The distinction between insectivorous species and vegetarians correlates strongly with ecological parameters like minimum temperature and seasonality (Johnsgard 1986, del Hoyo *et al.* 1994). The species in the insect dependent group tend to be tropical forest species and many have proven to be difficult to

Table 1. Proximate composition of items found in diets in pheasants. All nutrients on a dry matter basis (except water).

Diet item	crude protein %	crude fat %	soluble CHO/ sugar %	crude fibre %	water %	calcium %
insects	40-77	8-50	insignificant	5-18	60-70	<0.3
spiders	20-70	20-50	?	<5	?	<0.2
seeds	5-15	10-50	20-40	<5	low	<0.5
nuts	5-15	40-60	20-40	<5	low	<0.5
grains	5-15	10-20	30-70	<5	low	<0.5
berries	<10	low	50-80	5-15	65-90	<0.2
fruits	<10	low	40-80	5-15	65-90	0.6
leaves	15-25	low	15-40	>15	50	0.3-2.0
grass	15-25	low	10-25	>15	50	0.3-2.0
shoots	15-25	low	40-60	5-15	75-90	0.3-2.0
moss	15-25	low	20-40	>15	50	0.3-2.0
roots	10-20	low	40-70	5-15	80	0.2-0.5
flowers	10-15	low	30-40	10-20	20-50	0.5
mollusks	40-60	low	insignificant	<5	75	>10
vertebrate	40-60	mod-high	insignificant	<5	75	1.0
crustacean	40-60	low	low	5-15	75	>10
worms	10-15	10	25-50	10-20	75	1.0

breed in captivity. For insectivores, availability of live food could also be important, as a psychological trigger. Ecological parameters such as temperature, light levels and photoperiod may also be significant here.

While this analysis shows that existing literature can provide us with significant and useful information, it also confirms the need for aggressive work, both in the field and in captive collections, if we are to succeed in preserving the world's rare pheasants. Analysis of insect proteins. comparative digestive efficiency in different pheasants and studies of health and reproductive success relative to dietary protein intake should be made a priority.

Applications

The two most typical pheasant diets used by aviculturists are commercial poultry pellets, typically 15-25% protein, 1.0% calcium, or a mixture of seeds and grains, sometimes supplemented with greens. Depending on the mixture, a seed/grain diet may provide protein ranging from less than 10% to slightly over 20% crude protein.

Table 2. Estimated dietary protein for groups of wild pheasants consuming different combinations of foods.

>15% Protein
Group IIB
satyr tragopan
western tragopan
cabot's tragopan
blue eared-pheasant
mikado pheasant
Chinese monal
golden pheasant
brown eared-pheasant
blue eared-pheasant
Reeves's pheasant

>20% Protein
Group IIA
cheer pheasant
Swinhoe's pheasant
copper pheasant
Indian peafowl
Temminck's tragopan
koklass pheasant
green pheasant
ring-necked pheasant
Blyth's tragopan
blood pheasant

>25% Protein
Group IA
Himalayan monal
kalij pheasant
red junglefowl
silver pheasant
grey junglefowl
crested fireback
Lady Amherst's pheasant
Sclater's monal

>35% Protein
Group IB
green junglefowl
great argus
crested argus
Malaysian peacock-pheasant
Ceylon junglefowl
grey peacock-pheasant
Bulwer's pheasant
green peafowl
crestless fireback
Siamese fireback
Congo peafowl
mountain peacock-pheasant
Siamese fireback
bronze-tailed peacock-pheasant

Such diets may be deficient in calcium, unless sufficient greens are supplied. If well formulated, these two types of diets are probably adequate for species in Group IIA and Group IIB.

As a guide, we have described a basic diet for each pheasant group. These should provide adequate nutrition, based on our current level of knowledge. It must be kept in mind that birds may not consume different ingredients of mixed diets in the same ratio as they are fed. To really know levels of nutrients consumed by birds, intake must be recorded, not diets as presented.

Pheasants in Group IIB — low protein: Two parts maintenance poultry pellet (with 16% crude protein) to one part (by weight) mixed greens (kale, mustard greens, spinach — not lettuce). If you are collecting fresh leaves instead of or as a supplement for commercially grown greens, be sure you do not inadvertently choose a toxic species.

Pheasants in Group IIA — low to moderate protein: Two parts breeder pellets (about 23% crude protein) to one part (by weight) mixed greens (see notes for Group IIb), will give a diet with approximately 20% crude protein.

Pheasants in Group IA — moderate to high protein: Egg white is a good protein supplement. A diet which is two parts (by weight) breeder pellet to one part cooked egg white, will produce a diet with a protein content of 25-30%. Eggs can be boiled, and the whites separated, or raw eggs can be separated and the whites microwaved or poached until solidified. It is also possible to purchase unsweetened egg white powder, which can be reconstituted and cooked.

Pheasants in Group IB — high protein: Equal weights of breeder pellet and cooked egg white give a diet with >35% crude protein. Supplement this diet with calcium — a sprinkle of crushed oystershell or calcium carbonate.

We have not suggested using commercial protein supplements, like those sold for body-builders, because these also contain high levels of other nutrients. Commercial poultry pellets are generally formulated to supply more than sufficient levels of other nutrients.

Acknowledgements

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Mountain grown Danfes
An organic approach to raising Himalayan monals

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Introduction

Eight years ago, I became totally captivated by the spectacular Himalayan monal or Impeyan pheasant *Lophophorus impeyanus* whose existence was first brought to my attention by a television programme, *Strictly for the Birds*. This was an hour-long look at a selection of the world's most spectacular birds (a Survival Anglia film). Amongst them was a segment on the Himalayan monal, the National Bird of Nepal, where it is known as the 'Danfe' or 'Bird of Nine Colours' (WPA 1980: 4-7).

Based on reviews of as many publications as I could locate, I concluded that our Arizona residence might be in an ideal location for keeping Danfes, and that has indeed proven to be the case. In February 1992 (after 18 months of aviary construction!), I obtained a pair of two-year old birds, from a pheasant breeder in eastern Washington state (Ed Benhardt). I now have a flock of 24 vibrantly healthy individuals, all offspring from the original pair. All of these birds are kept outdoors year-round, under as nearly natural conditions as it is possible to provide within the confines of an aviary.

This is an account of a very successful and rewarding attempt to maintain and breed Danfes in the semidesert mountains of southeastern Arizona, and it documents many deviations from what might be termed 'accepted' treatment, as recommended repeatedly in the literature. It is this aspect of the story that I will tell below, the major objective being to demonstrate that a more 'natural' approach can be highly successful, given an ideal climate and habitat in which to undertake the project. I believe that many factors have contributed to the overall success of this project. I would be keen to have feedback from others who may find some of these concepts either heretical or intriguing, or both.

In any undertaking that involves the care and breeding of living things (be they plant or animal), my primary objective is to strive for the creation of optimum health. If this objective is successful, then the result is that there is no need to 'medicate' or to focus upon countless diseases. Such an approach (unfortunately and incredibly) is often dismissed as eccentricity, and it rarely seems to generate the open-minded interest and curiosity that one would (logically) expect (Salaman 1994; Allen 1993:20).

Habitat and enclosures

Our location here is on a five-acre parcel of undisturbed oak woodland *Quercus emoryi*, mingled with manzanita thickets *Arctostaphylos pungens* — a large shrub of the family *Ericaceae*), on a south-eastfacing slope at the entrance to Ash Canyon, in the southeastern foothills of the Huachuca mountains; the elevation is 5,100 feet above sea-level. In 1991, I was able to construct three separate enclosures on virgin rocky ground covered with oaks, large manzanita bushes, other smaller bushes, and native perennial clump grasses. Inside the largest pen (approx. 50 by 25 feet), are three small and three medium-sized evergreen oak trees (up to approx. 15 feet high). The two largest trees have several massive lower limbs and numerous sturdy secondary branches that extend far above. This gives the birds easy access up into the highest parts of the trees, where they invariably go (to the last bird!) for roosting at night (Beebe 1936: 81-82). Most of them show a distinct preference for getting as far above the ground as the enclosure permits (Beebe 1936: 72-73). In this largest pen (pen three) is a flock of 16 birds (nine males, seven females). They all roost together in the two largest (adjacent) trees, each individual on its own branch, but often fairly close together (Beebe 1936: 81). As these trees have a south and eastern exposure, they capture the earliest rays of the rising sun in winter, when it is most needed after the long, cold nights.

As the sun rises, most of the birds will be perched facing east and south, so that the low sun strikes the all-black breast and underside (in the case of males). This may serve as a rapid-heating system on cold mornings (?). On the coldest mornings

All photos: Noel McFarland

Quercus emoryi oak - *'each individual on its own branch'*.

I cannot over emphasise the great importance of abundant and continuous access to unobstructed sunlight.

they often stay perched high in the trees, soaking up the relatively weak sunlight for several hours, before coming down to seek food. On summer (or warmer) mornings, most of them are on the ground by first light, or fairly soon thereafter. But a few usually remain behind in the trees, soaking up additional sun (as desired by each individual on any given day); this is a variable part of the daily routine, each bird remaining in the tree for exactly as long as it wants. A few individuals of both sexes (primarily those near the bottom of the pecking-order) spend much of the entire day at rest in the trees, except for brief forays down to seek food and water.

The trees play a most vital role in alleviating the negative effects of crowding and aggression, by vertically expanding the available perching-space within the enclosure. For primarily ground-active birds (like most galliformes) this feature provides a valuable tension-reducer, allowing shy or stressed individuals to withdraw at any time. Sparring and squabbling (although never drawing blood) is almost constantly taking place during the breeding season, which commences here about late February and winds down about late April. The squabbles (usually brief) are accompanied by much chasing and shrieking (both sexes do this), but once a chased individual 'exits' up into a tree, he/she is not usually pursued any further. The main activity is on the ground; the trees are for 'time out'! This facilitates keeping more individuals of both sexes together in the same enclosure than would ever be possible minus the trees. When the breeding season is over, they are once again one big happy family back on the ground, feeding, digging, and dust-bathing side-by-side, with rarely a squabble but for brief 'encounters' which soon terminate (Beebe 1936: 79, 84). This is the typical pattern for about nine months of the year (May or June through January), in my mixed flock of 16 adult birds with no chicks present. [The breeding pair are kept separated in their own enclosure (pen two), well removed from others of their kind — more on this later.]

The local climate

We are halfway between 31- 32º latitude here, which means that our somewhat lower than preferred (by Danfes) elevation of 5,100 feet may be more or less 'equivalent to' about 6,000 or 7,000 feet in the slightly lower latitudes (27 - 31º) of the Himalayas (?), with reference to extremes of mid-winter cold. Humidity is low throughout most of the year, except for brief periods following heavy rains.

Temperatures: Nocturnal winter lows typically range from the mid/low 30s or high to mid 20s (°F), with occasional brief spells that drop down into the 'teens. Winter days are most often crystal-clear with bright sunlight, the highs typically reaching into the high 50s and 60s, or even the low 70s (°F). In June (the hottest and driest month here) temperatures steadily climb, most days reaching the high 80s to low 90s, with brief spells even reaching or slightly surpassing 100ºF. When the rains finally arrive (about early to mid July), diurnal highs are rarely as extreme as they were in June.

Importance of daily sun exposure

The 16 Danfes in pen three are exposed to all weather, with only the shelter of the evergreen oaks and some rather dense manzanita bushes (also evergreen). Mostly they choose to sit quietly, high up amongst the oak branches, during rain or snow storms. On clear days year-around (and even in summer) much time is spent at rest on the ground sunning, during mid to late morning and well into the afternoon, or dust-bathing on bare patches of ground (in sun or shade, depending on suitability of soil conditions). Individuals of both sexes regularly spend 30 minutes or more dust-bathing — tipping to alternate sides while kicking the dry to slightly damp soil high up over themselves, and then shaking it down through the feathers. Sunning males will sometimes completely fan-open their tails and hold them that way, angled to intercept the maximum sunlight.

I cannot overemphasise the great importance of abundant and continuous access to unobstructed sunlight, with plenty of room for all of the birds to seek out separate locations, in which to sun themselves or dust-bathe, without crowding and annoying each other. In a roomy and well-planted pen, the birds become very noticeably calm and peaceful under such conditions. This is in dramatic contrast with the more usual situation seen in barren, cramped and dismal sunless quarters, where frantic pacing along the fence-line is a typical response to the sudden appearance of a person or animal.

I suspect (but cannot prove) that consistent availability of sunlight is one of the very most important of all health-promoting factors (Biser 1990, Ott 1976) — nearly as important as correct diet and a fresh/clean water supply. This is not to say that many species cannot be adequately maintained (in relatively good health) in the

Islands of oak logs, large rocks and smaller boulders play an important role.

absence of sunlight, or under full-spectrum artificial lighting, but the level of health (and thus of resistance to disease) is clearly diminished when diurnally-active species are deprived of sunlight levels that are at least roughly equivalent to that found in their native habitats. I contend that the Danfe is no exception here! And, aside from its demonstrated health-enhancing effects (Biser 1990, Ott 1976), there is simply no substitute for bright sunlight when viewing an iridescent bird. This is one of the reasons I keep them — just to look at daily (an unending visual feast)!

While stressing the great importance of easy access to sunlight, it is equally important that dense and abundant shade should also be readily accessible at all times of the day (but particularly 10am to 3pm in hot weather). Constant availability of all intensities of both sun and shade, as found in the presence of scattered trees and shrubs in nature, is the ideal environment for which to strive. The birds will then be able to choose exactly whatever they need exactly when they need it. In cramped quarters this level of subtlety is almost impossible to achieve. There is simply no substitute for ample space and diverse plantings!

Management of the soil

Depriving this particular species of pheasant from direct contact with the soil is tantamount to confining a monkey in a small cage with nothing to climb upon! Danfes, if allowed to do what they would normally do under natural conditions, will spend literally hours every day avidly digging in the soil and leaf litter beneath trees and shrubs. I am fully aware of their increased potential for encountering parasites/pathogens as a result of such activities. However, if all of the health-promoting/immune-supporting factors are constantly made available (*ie* correct and diverse foods of high quality, pure (chemical-free) water supply, daily sunlight, lack

of crowding, and no other environmental stressors, *etc*), then potential hazards of contact with the soil are probably much diminished — the more so if the location has a sloping and southern/eastern exposure, meaning rapid dry-out after rain or snow, with no large areas of mud or standing water, and with earliest access to any sunlight on cold winter mornings.

I frequently mulch certain areas of the soil (but not all of it) with deep layers of alfalfa (lucerne) hay, which is, incidentally, loaded with trace elements. The birds often eat bits of this when it is fresh and first introduced, but most of it soon rots down into the soil, where its purpose is to provide ideal conditions for the rapid growth of soil-inhabiting scarab beetle larvae, whose adults are commonly known as 'June bugs'; their larvae are the fat white grubs of garden infamy, which the Danfes eagerly seek while digging every day! Their efforts are thus frequently rewarded with very substantial and top quality live food, produced from mineral-rich alfalfa. Digging is not the futile (and no doubt frustrating!) exercise that it would be under the typically 'sterile' conditions so widely recommended. These are happy birds! I even endeavour to attract (with ultraviolet lights) large numbers of the night-flying adult scarab beetles into the aviaries, where they will encounter the rotting hay and lay their eggs in abundance beneath it. Later, as the grubs develop, the Danfes hunt for them. To further increase this beetle-attracting potential, I dump occasional wheelbarrow-loads of rotting emory oak leaf that grow in the hills nearby. This enriches and diversifies what is already there (the rotting hay). The abundant mulching also encourages earthworms to remain up near the surface (in all of the constantly damp locations), even during the dry season. In more open or sunbaked areas, the earthworms retreat deeper down into the soil and thus out of reach. Many other areas on the ground are kept intentionally bare of any top-dressing, so that the birds can always find numerous places suitable for dust-bathing. By always spreading the hay and dead leaf litter in exactly the same

These aviaries have been in continuous use since 1992.

(mostly shaded) locations, a steady increase of grubs is also encouraged in those places. The birds soon learn where these 'goldmines' are located.

Rocks, boulders and logs

Islands of oak logs, large rocks and small boulders play a very important role in my soil-modification system. These serve as reservoirs or 'safe havens' for at least a percentage of the beetle larvae (grubs), as well as other soil fauna. This ensures that the Danfes can never totally deplete the soil fauna in those (rather limited) damp areas where all 16 of them are digging every day! Placement of these small rock fields is also important; they are (mostly) adjacent to one side or another (or in the middle) of the mulched damp zones, so that the beetle larvae and earthworms can burrow up from beneath them to obtain food at night (the rotting hay *etc*), and then retreat back down their tunnels (close to or beneath the logs and rocks) before the Danfes arrive for the morning shift! Many of the grubs are, of course, too far out into the unprotected (rockfree) zones, and so are eventually found by the digging birds. These strategically placed rocks and logs thereby increase the effectiveness of my efforts to provide a continuous live food smorgasbord for the Danfes (with no extra labour on my part).

In certain of the more open and sun-exposed areas, where haymulching is never done, I spread blankets of rough and crumbly decomposed granite particles (of many sizes and shapes, from coarse through fine), about an inch deep on the surface of the ground. This is for the birds to pick through and ingest whenever they want it. It is also valuable for application to any areas of heavy soil that remain excessively muddy after rain storms. Additionally, gypsum and/or pumice can be dug into such places, to break up the clay and increase soil permeability.

By now, it should be very apparent why the word 'organic' appears in the title of this article! My entire approach is very organic, and most particularly in management of the soil. The presence of rotting hay and leaf litter also contributes to a more rapid breakdown of the droppings, as do the earthworms and some of the soil insects. And dropping-disintegration is further assisted by regular flooding and water-blasting, done manually with a garden hose about once per week. As this is essentially a 'dry' climate, I can get away with such activities here. (This approach is not recommended for more continuously-damp localities.) After these periodic waterblastings, the exposed areas of ground are allowed to sunbake and dry out again, which regimen probably makes life more difficult for at least some of the parasites/pathogens.

These aviaries have been in continuous use since 1992-93. There has not been a single Danfe death (nor any sign of illness) to date. All of the (24) birds are vigorous, alert and active (often quite vocal), with brilliant feathers, clear/sparkling eyes, and intense blue on the bare orbital skin. The droppings are well-formed and look good, although they vary greatly in appearance and consistency, in response to

variations in the diet. No chemical treatment of any type has ever been used inside any of the three (adjacent) aviaries. The aviary soil is alive with many of the native organisms of this habitat, possibly even in greater numbers within the pens than outside (due to the regular application of alfalfa hay and rotting leaf mould, as described above). Although there are hazards associated with this type of environment, I suspect that the Danfes maintain peak health due to all of the health-promoting factors being firmly in place here. as a constant part of their environment. Thus, health and resistance remain high. This is as close to imitating the best in nature as one could hope to get with captive animals.

Even though this approach may not be applicable to many (or even most) aviary situations, it would certainly be worth trying if the interest is there, and the local environment would appear to lend itself to such an experiment. In any event, the more one focuses on creating vibrant health, the less it becomes necessary to treat an endless litany of diseases — or even to know anything about them. This is the very essence of the 'natural' or preventative approach. But this most rewarding approach is the exception (not the rule) in our glitzy, high-tech civilisation, where there is always some toxic chemical or poison available to throw at each new disease that comes along. If even one of the more important health maintaining factors is absent from the created environment, one can count on the arrival of trouble sooner or later. There is nothing 'mysterious' about ths natural approach; break one (or more) of nature's laws, and evolution of disease is the guaranteed result. The length of time that symptoms take to manifest will be in direct relation to the severity of the deficiency, and/or the number of inflicted oversights.

An example of an 'inflicted oversight' would be the failure to provide access to any sunlight, even though diet and level of cleanliness might receive top marks. Another 'oversight' could be permitting the numbers of birds to increase to a level where overcrowding becomes a non-stop daily stressor. Everything else might be ideal, but the constant stress of overcrowding is one (of various) pathways toward eventual weakening or breakdown of the immune system and everyone knows where that leads. Although most 'natural laws' are not difficult to comprehend once understood (and then taken seriously), their various interactions can indeed be complex. It is in this area that we still have a need for continuing careful observation and experimentation). This is at times a challenging way to go; yet at other times it is incredibly simple to implement, and the rewards can be immense. But the inclination or desire for this approach must be in place first. Basic to this whole system is a predilection for constant/incisive observation, coupled with a willingness to let the birds do the teaching — and to act upon what is learned!

To be continued....

[The second half of this article covers feeding, watering and observations on breeding and should appear in **WPA News** *57. Ed.]*

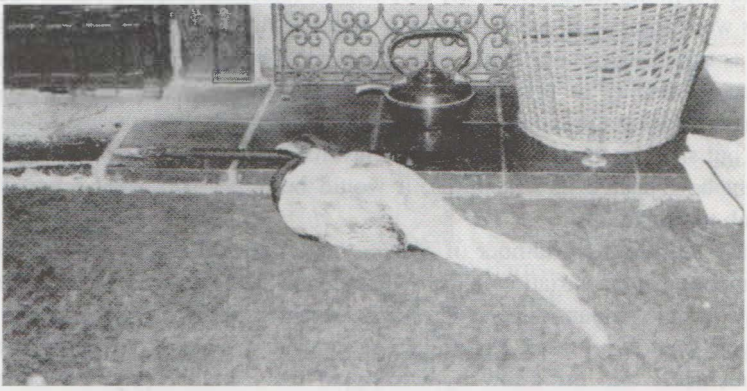
It's all down to the hormones

John Corder

Recently, a group of delegates on the Wildlife Tour were able to visit the Sungkai Pheasant Breeding Centre during the Malaysian symposium. Whilst there, I was asked to look at a pair of Malaysian crestless fireback because the female had begun to look like a rather scruffy mail. There was some concern that the bird might be unwell or be suffering from some sort of vitamin deficiency. When I asked about the age of the birds I learned that they had been a very productive pair for many years, although they had not produced any eggs in the last year or so.

Surprisingly, quite a number of people there had not realised that, when elderly female birds stop laying, hormonal changes take place which result in plumage changes in subsequent moults. Of course, many other delegates knew far more about this process than I did but, in an effort to pass on a little information to those who have not come across this previously, I thought it might be useful to put pen to paper on the subject.

I am indebted to Dr Tim Lovel for providing more accurate physiological information than I am able to do. Basically, female adrenal cortex produces a little of the hormone testosterone but, all the time that a female is capable of laying, this is greatly outweighed by the oestrogen that she produces. Once ovulation ceases, oestrogen is no longer produced and a small amount of testosterone lacks any opposition. Consequently, it begins to play a significant part in the plumage which



Brook the silver pheasant above, began life as a hen and laid until the age of 15. He/she finally died aged 18. 'It' belonged to Peter and Dottie Dean and acted as guard dog when they went shopping - it was reared in and spent its life in their house.

appears during the following moult. If the hen continues to survive, subsequent moults seem to increase the male colouration, although this seldom achieves the full brilliance of some of our male pheasants.

As most members will know, hens tend to use only their left ovary in egg production - which is the reason why we put identification rings on their left leg (and therefore the males are rung on the right). I have heard it said that, because females only use one ovary, when they cease egg production, the hormonal swing is greater, therefore the masculine appearance is much more obvious. I do not know whether there is any truth to this, but I hope someone out there might be able to enlighten me. What must be stated is that although the bird has a masculine appearance, it does not become a male, so we cannot say that the bird has changed sex.

I am not aware of any previous WPA articles on this subject, so perhaps you might be able to add to the pool of knowledge from your experiences with breeding birds. I suppose it would be unlikely that these plumage changes would be noted in wild birds because it is unlikely that they would be known well enough to identify individual females. Also, the changes could only be noted when dimorphism is present (where males and females naturally look different).

The first time that I encountered gynandry was in an old imperial pheasant hen, the last of the species remaining in London Zoo in the 70s. She looked like a rather tatty male before old age carried her off. At present, we have a 13-year-old golden hen that has a number of male characteristics. She laid her last, infertile, egg early in 1996 and, after she began her subsequent moult, some pale yellowish feathers began to appear on the top of her head. In addition, a few reddish feathers grew on her breast and flanks, her tail grow a little longer than usual, and the central feathers developed some spotting. Since the spring of 1997 she has never laid again. Her moult last summer transformed her into almost full male plumage, although all the colours were somewhat duller than those of the male. Her tail is not quite the same length as that of her mate. In his eyes she is still female because, not only does he continue to display to her, but he even tries to tread her as well. For a time, particularly during the moult, the female appeared quite geriatric and disinterested in life, but she has since become quite rejuvenated. One assumes that, should such an event be repeated in wild birds, it would be quite likely that females would succumb to probation.

I have seen quite a number of gynandrous golden pheasant females and been quite surprised at the variation in the male plumage development. Perhaps this might be related to the amount of testosterone that different individuals produce.

If you have any further experience of gynandry, perhaps you would let other WPA members and me know by writing to the Editor. If you are considering including the use of the title word in your next trivia quiz, you may wish to know that the letter 'g' is pronounced like the one at the beginning of the word 'garage' not like the one at the end.

PARTRIDGES & FRANCOLINS

their

Conservation, Breeding & Management

G.E.S. Robbins