



FALCO

The Newsletter of the Middle East Falcon Research Group
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FALCO is published biannually and contains papers, reports, letters and announcements submitted by Middle East Falcon Research Group Members. Contributions are not refereed: although every effort is made to ensure information contained within FALCO is correct, the editors cannot be held responsible for the accuracy of contributions. Opinions expressed within are those of the individual authors and not necessarily shared by the editors.

Call for microchip and ring recoveries

Each breeding season field-biologists for the National Avian Research Center Falcon Research Programme implant microchips (PITs) and fit rings to wild saker and peregrine falcon chicks, juveniles and adults in the range countries. Occasionally recoveries of these marked birds are made in the falcon hospitals of Arabia.

The numbers of recoveries have recently declined and it is possible that valuable information is being lost. The purpose of this marking project is to investigate falcon populations that are targeted by trappers, and the sustainability or otherwise of harvest rates. This information is obviously of crucial importance in conserving falcon species affected by Arab falconry.

Previously, microchips implanted in wild falcons were prefixed with 111. Now, however, this prefix is no longer in use and wild birds are marked with random identification numbers.

If you are marking birds, or find a bird with an unknown PIT or ring number, please send the following information to the MEFRGdatabase at the editorial address:

DATE:
IDENTIFICATION NUMBER:
SPECIES:
SEX:
AGE:
LOCATION OF MARKING OR RECOVERY:

If the falcon is recovered in a hospital then it is worth asking the falconer where he acquired the falcon. Additional data such as body measurements and photographs would be worth collecting for morphometric studies.

Please could all details of falcons marked and recovered be sent to the editorial address, where the information will be recorded on the Microchip and Ring Database. Many thanks.



Nigel Barton
MEFRGPITand Ringing Scheme Co-ordinator

MEFRG Objectives:

To provide:

A central body for the co-ordination of research activities related to falcons and falconry.
A common forum for the exchange of information and for promoting collaborative research programmes.

To promote:

Research on health and disease in falcons, falcon moulting in the Middle East, falcon nutrition, domestic breeding.
Field studies on falcon migration, taxonomy, morphometrics, reproductive biology and behaviour.
Improved management conditions for captive falcons through educational awareness programmes.
Greater understanding of falconry as a part of Arab cultural heritage.

To Hold:

Regional and International workshops and conferences on veterinary aspects, falcon biology topics, falconry and conservation issues.

To publish:

Papers on aspects of falcon conservation, falcons and falconry.
A biannual newsletter/journal containing contributions on medical, biological and conservation topics of common interest, new developments and recent medical advances.

Membership:

Membership is open to any veterinary surgeon, biologist, conservationist or falconer working in the Middle East or any other person interested and contributing in the fields of medical, biological and conservation aspects of falcons and falconry worldwide.

Contributions can be sent to the Editors of FALCO, Dr Nigel Barton and Dr Tom Bailey.

Editorial address:

Dr Nigel Barton
P.O. Box 19, Carmarthen
SA33 5YL, Wales, UK
Tel/Fax: (44) 1267 233864
E-mail: nigel-barton@easynet.co.uk

Veterinary contributions:

Dr Tom Bailey
P.O. Box 45553
Abu Dhabi, United Arab Emirates
Tel: 00971 2 5755155
Fax: 00971 2 5755001
E-mail: tabailey@erwda.gov.ae

Editorial



This issue of FALCO is published to coincide with the 2nd International Workshop on Saker falcons and houbara bustards, held in Ulaanbaatar, Mongolia. One of the primary objectives of the Middle East Falcon Research Group is to co-ordinate research on raptors from a variety of disciplines, including field ecology, aviculture and veterinary science. The MEFRG meeting in Mongolia will enable workers from the houbara and saker range states to meet and report the current status of these species in Central Asia and for the interested parties to develop strategies to enable their sustainable utilisation.

It is appropriate therefore that we begin this issue with a summary of Saker conservation in Mongolia, where the Environmental Protection Agency is working hard to monitor Saker populations and to develop ways to regulate the falcon trade. They have been especially active in the use of microchips to mark nestlings and the potential to use this as a tool for monitoring movements of falcons, both through migration and trade are encouraging. Two further articles in this issue, one from a press release, the other from research on the Taimyr Peninsula, Russia provide examples of how the system can work. We also have contributions from the Russian Altai and Kazakhstan where nest robbing and corruption are hindering the good intentions of fieldworkers in these regions. Nowadays political and economic factors need to be considered along with ecological considerations and conservationists need diplomatic as well as traditional biological skills to solve complex conservation problems.

Also featured in this issue is an article on the health problems of illegally traded houbara and a colour supplement and article by Dr Combreau and Mr Lawrence on the houbara ecology programme of ERWDA. The regional trade in falcons is closely linked to the trade in bustards, and falcon veterinarians in the Middle East, through their contact with falconers, are in a unique position to promote more sustainable practices. We would like to encourage falconers and falcon veterinarians attending hunting parties, to collect and return rings from Houbara that are captured to help us increase existing knowledge of Houbara movements. We thank Abdul Aziz and Abdulah Hamad Al Nasr's hunting group from Qatar for sending in their ringing returns and encourage other falconers to participate. Also, thanks to Mr Nabil Zakhour and the ERWDA Communications and Education Department staff for producing the ringing supplement.

We thank the busy falcon veterinarians who have taken

time to write articles on a number of topical issues, including amyloidosis, chlamydiosis and serratospiculiasis, that are relevant to the health of falcons used in Middle East falconry. We hope that MEFRG members will find time to support the pioneering work on *Caryospora* infections that Mr Neil Forbes is coordinating.

FALCO is currently distributed to people directly participating in research aspects of the group or who have genuine interests in the objectives of the group. Any persons who are not on our mailing list can visit www.falcons.co.uk/MEFRG/ where previous issues of FALCO are online.

News from the news

Congratulations to Dr Jaime Samour who has recently given birth to "Avian Medicine". Weighing in at 1841 grammes, this bouncing baby is a full colour practical text covering most aspects of the medicine and surgery of birds. A wide range of avian species are discussed in detail, including bustards and raptors, reflecting the extensive Middle East experience of the Editor and many of the contributors. Chapters range from capture and handling, clinical examination, diagnostic procedures and anaesthesia to detailed assessments of trauma, common medical conditions, surgical procedures and infectious diseases. The book is well illustrated with over 560 colour pictures and 170 black and white photographs and line illustrations and will be of great use to avian specialists, particularly those working in the Middle East and Central Asia. Congratulations also on the real birth of Merle and Jaime's daughter, Yasmeeen who arrived in May.

Birds of Prey given prominence at Wildlife and Zoo Pathology Workshop - The first European Wildlife and Zoo Pathology Workshop was held in 1999 at the Institute for Zoo Biology and Wildlife Research in Berlin. A session on raptors was led by Professor John Cooper and Dr Oliver Krone. It covered the collection and submission of samples for pathological, toxicological and other investigations. Formal lectures were followed by practical sessions in which participants carried out post mortem examination of dead buzzards. For further information contact Professor John Cooper, Jersey Wildlife Preservation Trust, Trinity, Jersey.

The Editors



Satellite tracking houbara

A short history of Saker Falcon (*Falco cherrug* Gray 1834) studies in Mongolia

Acad. Prof. O. Shagdarsuren
Faculty of Biology
National University of Mongolia

The Saker falcon is a common and rather characteristic bird of Mongolia. Most of the studies have been carried out in the 20th century. The first mention of the Saker Falcon is given by N.M. Przhevalskiy (1876). He constantly observed the Saker during his journey from Kyakhta to the upper Yan-Tsy-Tsyani river (China). Tugarinov A.Ya. (1929, 1932) treated the Saker as a breeding bird of the Selenge and Khentii. He also encountered this falcon in Khaalgan-uul (Sainshand) and along Kherlen and Khalkhin-gol rivers. The Saker was also observed by E.V. Kozlova in 1930 in South-western Kentii and in the environs of Ulaanbaatar, in Khangai at the Ongiin-gol river, along the Khaalgan Road (150-200 km south from



Acad. Shagdarsuren, Lama Gombodoo and Prof. Dementiev, Gandan Monastery 1959

Ulaanbaatar) and in the Khurkh mountains of the Gobi Altai. She observed Sakers in the highlands of Khangai, in Otgontenger and at the Sangiin-Dalai-nuur at the edges of forest massifs. The Saker was also observed in small numbers by Kozlova (1930) in the Eastern Khentii. In North-Western Mongolia and in the Mongolian Altai the Saker falcon was observed by P.P. Sushkin (1938). During the period 1942-1944 the Saker was observed and collected at many locations in Khangai, in Zag sum of Bauyankhongor province, Tsagaan-Olom (Zavkhan) and Shar-Usny-Gol (Tarasov, 1944). In the Gobi Altai this species was recorded by M.P. Tarasov (1960). Dementiev G.P. (1960) considered the Saker as a breeding bird of Trans-Altai Gobi.

We have a good number of observations of Saker Falcon in Mongolia. Most of the data were used for compiling the map of Saker distribution in Mongolia in 1964. According to our observations during the period of 1959-64 the Saker was recorded in most of the forest-steppe, steppe zones of Mongolia, in the Mongolian and Gobi Altai, Khangai,

Khuvsgul and Kentii mountains. Western and Eastern limits of the Saker distribution reaches the state border of Mongolia and goes beyond that. In the northern part of the country this species is known from the region of Sangiin-Dalai-Nuur lake and Selenge river. However, even by now there are no data from the Kuvsgul and Kentii-khan regions. In the Trans-Altai Gobi the Saker was recorded by us in 1959, 1960 in Segs -Tsaagan Bogd, Naran-Sevesteyn -nuruu, Aj-Bogd, Seruun-Khairhan, Noyon-Bogd, Gurvan-Saikhan and Khurh-uul.

In most cases the nesting habitat of the Saker was rocky mountains. In rocky hill areas and rolling steppes the Saker sticks to mountain outcrops with rocky bluffs. According to V.V. Bianki (1907, 1915) the famous P.K. Kozlov observed the Saker on numerous occasions during his expedition 1899-1901 in oases of Dyn-Yan and southern part of the Ala-Shan Gobi (Inner Mongolia, China).

In the Mongolian and Gobi -Altai and in mountain ranges of the Trans-Altai Gobi the Sakers are not rare. On one occasion in autumn 1961 in Unegtiin-Khundii (Mongolian Altai) we counted 7 Sakers within 20 km of the survey route. In the Mongolian Steppes the Sakers are more dense, especially in winter and autumn. In November 1962, on the road from Maanti to Choir railway stations (Khaalgan track route) the Saker was the most abundant bird of prey as was also observed in March 1963 in Bayan-Baraat-sum in Central Mongolia. In February 1963, in Khan-Bogd (Gobi) A. Bold shot 4 falcons within 1 day. A High density of Sakers was mentioned by E.V. Kozlova (1930) and P.P. Tarasov (1952).

There is some early published information on the diet of Sakers in Mongolia. M.N. Przhevalskiy (1876) mentioned that the Sakers have trophic links with Pikas. Also, according to his data the Sakers prey on Pallas' Sandgrouse and Steppe Hare. Similar observations were reported by P.K. Kozlov (Bianki, 1915). A.Ya. Tugarinov (1932) wrote that in Eastern Mongolia the most dominant item in the Saker's diet was Brandt's Vole. In the stomachs of most Saker specimens which he obtained, there were remains of this vole. In Western Mongolia the stomach contents contained rodents and small birds, whereas on the nest there were remains of Pallas' Sandgrouse and Choughs (Sushkin, 1938).

According to the data by Nasimovich (1949), Lipaev, and Tarasov (1952) in the territory close to the border

of Mongolia and Transbaikal, the Saker diet consists of rodents and birds. Rodents constitute 25-40% of the diet, whereas rodents and Pikas are representing the rest of the diet.

During our fieldwork we also studied the diet of Saker. In the autumn of 1959 in the Ushigiin-nuruu (Southern Khangai) and on the northern slopes of the Gobi Altai we observed Saker chasing Chukars. In the autumn of 1960 along the road from Tsetserleg to Yusun bulag we observed this falcon hunting pikas, sousliks and Brandt's Vole. We also obtained a specimen with remains of Pika in the stomach. In 1961 the specimen obtained in Baruun-Sertey, east of Dashin-Chilen-sum (Central Mongolia) contained remains of pika in the stomach. Two specimens obtained at Unegtiin-tal (Seruun-Khairhan, Mongolian Altai) contained remains of rodents. It appears that they were Yellow Gerbil, colonies of which were abundant in the region where the specimens were obtained. In Khan-Bogd the Sakers were feeding in early spring on Pallas' Sandgrouse. The stomachs of the falcons shot here by A. Bold and N. Khotolkuu contained Pallas' Sandgrouse remains.

Courtship display is poorly studied. P. K. Kozlov (cit. Bianki 1915) observed courtship at the end of February and beginning of March (1908) in Gurvansaikhan mountains. The males produced characteristic calls, chased females and circled around females sitting on the cliffs. The onset of clutch production was not recorded. However, in the second half of June the nests of Sakers in this place contained from 3 to 5 downy chicks (Kozlova 1930, Sushkin 1938).

Chicks were found in May by P. Kozlov (cit. Bianki 1915) in Northern China close to the Mongolian border. In Western Mongolia (Sushkin 1938) young Sakers were still close to their nesting sites in August. It appears that the chicks disperse from the second half of August to September. Both sexes look after the chicks. Even if the female is not present (being shot dead) the male continues feeding (Kozlova, 1930) and rearing. Many authors (Bianki, 1915, Kozlova, 1930, 1932, Sushkin, 1938, Tarasov, 1960) consider that nesting habitat of the Saker in Mongolia is high and steep cliffs and mountain tundras (Otkhontenger, Khangai mountains).

Many years of observation by Mongolian zoologists suggests that the Saker in Mongolia is a non-migratory species, which might make local movements in winter depending on the depth of the snow cover and food supply. In October and November in the Khangai highlands we regularly observed wintering falcons. Observations by P.K. Kozlov in Trans-Altai Gobi and Altai Gobi also support this opinion (cit. Bianki 1915). According to our data, moult is very intensive in the second half of June. By this time some of the birds have already replaced some primary feathers. In the first half of October obtained specimens were in fresh plumage. However some October specimens have the 1st and 2nd pair of primaries incomplete.

A total of 78 specimens of Saker falcon obtained in

Mongolia have been studied by us. According to their plumage we can divide them into 2 colour variations. First variation is the "Altai Falcon" type, the dark morph. Second is the light morph, or a typical Saker. However there is a lot of intermediate colour variation inbetween these two types. The most exciting in the collections is the series of falcons obtained by P. P. Tarasov (1944) in Khangai and our specimens from Khangai and Mongolian Altai. That is why we (Dementiev and Shagdarsuren) studied in detail in 1964 colour variations of the Sakers in the collections of Moscow, Leningrad and Ulaanbaatar and concluded that the colour variation of the Saker Falcon from Altai form to nominate race could not be used as a solid base for the treatment of the Altai Falcon as a separate species.

The 1990's are the most significant years for studies of the Mongolian Saker. In 1996 researchers from Mongolia, USA and Canada organised expeditions to Mongolia. Some of their observations were relevant to Saker studies. The National Avian Research Center (USA and UK) funded research by D. Ellis and P. Tsengeg (Ellis & Tsengeg 1997). They carried out initial study on the distribution and nesting biology of the Mongolian Saker. In 1998 the National Avian Research Center signed an agreement with the Environmental Protection Agency (EPA), Mongolian Ministry of Nature and Environment. According to the agreement, leading Mongolian field ornithologists (D. Sumiya, A. Bold & S. Gombobaatar) under the leadership of Acad. Shagdarsuren, Nick Fox and E. Potapov surveyed remote parts of the country in order to determine the numbers, density and distribution of the Sakers and study their breeding ecology. The study under NARC-EPA agreement fundamentally differs from all previous research. Firstly it is entirely focused on the species, second, it is designed for Saker observations all year round, and finally, it uses state of the art technology. The first two years of work has already generated a number of publications (Gombobaatar *et al.* 1999, Potapov *et al.* 1999a, 1999b, Potapov *et al.* 2000) and there are more yet to come.

References:

- Bianki, V.L. (1915). Materials on the avifauna of the Eastern Mongolia and North-West Tibet according to the data of Mongolian-Sichuan expedition 1907-1909 under leadership of P.K. Kozlov. v. 2. St. Petersburg. (In Russian).
- Bold, A. and Khotkolkhuu. N. (1963). Report of the Gobi Expedition. Academy of Sciences of Mongolia. Ulaanbaatar. (In Mongolian)
- Dementiev, G.P. (1963). Ornithological review of Mongolian Gobi desert. Ornithologia, 4. Moscow Universtiy Publishers. (In Russian).
- Dementev, G.P., Shagdarsuren, A. (1963). On Mongolian Saker Falcons and about taxonomical status of the Altai Saker and Gyrfalcon. In: Studies on the Fauna of the USSR. Proc. of Zool. Mus. of Moscow St. Univ. Vol.9. P.3-37.

Ellis, D. and Tsengeg, P. (1997). Remarkable Saker Falcon (*Falco cherrug*) breeding sites in Mongolia. *J. Raptor Research* 31(3): 234-240.

Gombobataar, S. *et al.* (1999). On Saker (*Falco cherrug*) diet studies in Mongolia. Proc. 2 European Conference of the Raptor Research Foundation, Mikulov, Czech Republic, November 1999. *Buteo suppl.* 1999: 50.

Kozlova, E.V. (1930). Birds of the south-western Transbaikal, Northern Mongolia and Central Gobi. Academy of Sciences of the USSR publishers. V. 12. Leningrad. (In Russian).

Lipaev, V.M. & Tarasov, P.P. (1944). Materials on the diet of birds of prey in the south-eastern Transbaikalia according to the pellet study. Proc. of Irkutsk State Anti-plaque Institute of Siberia and Far East. V. 10. Irkutsk. (In Russian).

Potapov, E., Banzragch, S. and Shijirmaa, D. (1999a). Paradox of industrialisation in Mongolia: expansion of Sakers into flat areas is dependent on industrial society. *Falco* 13: 10-12.

Potapov, E. *et al.* (1999b). Keep the steppes tidy: impact of litter on Saker Falcons. *Falco*, Middle East Falcon Research Group Publications. *Falco* 14: 11.

Potapov, E. Fox, N., Shagdarsuren, O. Sumya, D.,

Gombobatar, S. (2000). Home ranges of Saker Falcon in Mongolia. *Falco* 15: 10-11.

Przevalskiy, N.M. (1876). Materials of the ornithological fauna of Mongolia and Tangut country. V. 2. St. Petersburg (In Russian).

Sushkin, P.P. (1938). Birds of North-western Altay and adjoining parts of Mongolia. V. 1 and 2. Academy of Sciences of the USSR publishers. Moscow. (In Russian).

Tarasov, P.P. (1944). Biological observations on birds of prey and Owls (Falconiformes and Strigiformes) in the south-western part of Transbaikalia. Proceedings of the Irkutsk anti-plaque Institute of Siberia and Far East. Irkutsk. (In Russian).

Tarasov, P.P. (1960). Materials on the fauna of birds of South-eastern part of Mongolian Altai and adjoining Gobi. Biological Collection of papers. (In Russian).

Tugarinov, A.Ya. (1929). Northern Mongolia and birds of this country. Mongolian Commission on the studies of Mongolia and Tannu-Tuva Republic. V. 3. Leningrad. (In Russian).



Saker Falcons of the Russian Altai

Valeriy Moseikin
Ecology and Evolution Institute
Saratov
Russia

Russian Altai covers a significant territory and is located at the border of global biological zones such as southern taiga forest, arctic and cold deserts of Central Asia and fertile steppes of Kazakhstan. The variability of biological conditions, landscapes and vegetation communities of Russian Altai predetermines the variability of animals. One can find here characteristic species of taiga forest, deserts and mountains of the Eastern Palaearctic. In the Russian Altai one can find the largest and most unusual phenotypes, legends of which are passed down amongst generations of falconers. For many years nobody was studying the questions of biology, ecology and systematics of these falcons. Although there are some works which deal with avifauna of the Altai mountains, there are limited accounts on the Altai Sakers. In recent years, the studies in the territory of the Russian Altai have been carried out by the National Avian Research Centre (UAE). For this reason it has been possible to obtain some data on the numbers and distribution of the Saker in this region.

Current systematics recognise only two subspecies of Saker living in the Russian Altai Mountains. According to the latest taxonomic list of the former USSR (Stepanyan



Altai Saker

1979) all Altai plains are inhabited by the nominate form *Falco cherrug cherrug*, which throughout this paper I refer to as the Steppe Saker. The second sub-species is the Tibetan Saker *F. ch. milvipes* which occur in the mountainous part of the Altai and in contrast to the Steppe Saker has two colour morphs - dark and light. Here I have to comment that this taxonomic division was based on a very limited number of museum skins. In the older literature (Dementiev 1951) there was a form named the Altai Gyrfalcon or Altai Saker, however in the last decades, ornithologists seem to have ruled out the very existence of this species.



Altai mountains

Nevertheless since the beginning of our studies in the Russian Altai, we have encountered large falcons which do not correspond to any of the forms described in the recent ornithological literature. Probably we found hybrids of the Sakers with Arctic Gyrfalcons, which theoretically could migrate to the Russian Altai. However, the fact that these birds are regularly observed here, would lead us to suspect that we have here a previously unknown form of falcon, which still survives in the remote regions of the Russian Altai. Before the systematic status of the birds becomes clear, we can call these birds *F. ch. altaicus* Menzbier.

Steppe Sakers (*F. cherrug cherrug*)

This large subspecies inhabits the plains of Altai and adjoining steppes of southern Siberia. Colour and morphometric characteristics of these birds correspond with that of the Sakers from other regions of Russia. We regularly observed Sakers with similar characteristics on the opposite side of the Altai Mountains: in the Chuya steppe and at the border with Tuva and Mongolia. It is interesting that according to the data by Kuchin (1968) the steppe Sakers were noted only in the 1960s. Kuchin (1968) explained the occurrence of Sakers here and the subsequent increase in numbers as being due to the expansion of the range and increase in numbers of Red-cheeked Souseliks (*Citellus erythrogenys*), which was the main food of the Steppe Sakers. Surveys of Steppe Saker numbers carried out in 1998 show that the steppes are holding a maximum of 200 pairs This is at least half the predicted forecast. We seem to be witnessing a rapid decline in Saker numbers in the Mongolian Altai, associated with the rapid disappearance of the Red-cheeked Souseliks. Previously such situations were reported in other steppe regions of Russia, and we suspect a similar reason for the decline. We consider the extinction of Souseliks was caused by degradation of the plant communities caused by global climate change. If this is true, we can predict a further decline in numbers of Sakers in the Altai plains and their complete local extinction in the next 10-15 years. So far we have found a limited number of pockets with a reasonable density of Steppe Sakers. In some locations the density can reach 5 pairs per 10 km².

The steppe Saker is using old tree nests of Black Kites (*Milvus migrans*) and Imperial Eagles (*Aquila heliaca*). Unfortunately, during the breeding period, many of the nests fall apart resulting in high chick mortality. A fact noted previously by Kuchin (1968) and Schekin (1965). According to the food data, the Sakers were feeding mostly upon souseliks, small rodents and small passerines. The proportion of diet items differs according to the season, but the most significant portion is Souselik. The steppe Saker is a migratory bird, and it appears that they overfly the populations breeding in the south. The precise location of the steppe Saker is not known, it is possible that their wintering grounds are towards Kazakhstan and the Middle Eastern countries.

Mountain Sakers (*F. cherrug milvipes*)

Distribution of Mountain Sakers is linked to mountain relief and rock formations. The nesting sites are also linked to long-tailed Souseliks (*Citellus undulatus*). Besides Souseliks, the Daurian Pika (*Ochotona daurica*) plays an important role in the diet. Numbers of these small mammals are more or less stable. The Mountain Sakers are large, and compared to the steppe Sakers look stockier with a stronger build.

The dark morph falcons live in the highlands during the breeding season and do not occur in the lower and middle forest belt i.e. where one can find the nominative race. It is possible that birds which we call the black morph birds belong to the dark morph of the Altai Saker, since during the breeding season they stay in the habitats occupied by the Altai Saker. To clearly distinguish the Mountain Saker from the Altai Saker is difficult since there are many hybrids on the marginal territories which exhibit characters of both forms.

Besides plumage differences, mountain Sakers differ from Steppe Sakers in flight. This is very obvious when after demonstration of flight of the steppe falcon one is shown a flight of the Mountain one. The mountain bird flight is heavier and stronger than that of steppe birds. It should be

noted that flight amongst steep slopes and rocks requires stronger and more manoeuvrable flight. It could be hypothesised that falcons hunting in mountainous regions have evolved shorter and broader wings. The Steppe form has longer, narrower wings and so cannot compete with the mountain birds, which might act as an ecological barrier between the forms. Traditionally the mountain Sakers from the Russian Altai are considered to be rare, however this may be not so. The myth of the rarity of the mountain falcon is due to the fact that it is difficult to detect. Studies show that the Russian Altai holds at least 300 pairs of these birds.

A surprising result of the work carried out during the 1998 and 1999 breeding seasons was that only 40% of the Sakers took part in breeding. Probably this was a result of the poor food situation and large proportion of the immature birds in the population. All known nests of the Mountain falcons were located on cliffs. In the proximity of lakes, the nesting cliffs were also preferred by Ruddy Shelduck (*Tadorna ferruginea*). The mountain Saker starts breeding 10-14 days earlier than the Steppe Saker inhabiting the adjoining territory. It looks as if the mountain Sakers are specialised on another prey species, mainly on the long-tailed Sousliks which wake up after hibernation earlier as the snow melts on slopes earlier than in the lowlands.

The mountain Sakers would be correctly named as nomadic species, as many of them stay in the breeding grounds in late autumn and even in winter, as long-tailed Sousliks are active up to end of October, and Daurian Pikas do not hibernate. In the Chuya steppe, where the density of the Pikas is highest and there is not much snow, the Sakers sometimes concentrate in large numbers, but in severe frosts they migrate to the South to Mongolia and China. This is also supported by data obtained by satellite telemetry (Eastham 1998).

Altai Saker (*F. cherrug altaicus*)

This is the most mysterious falcon in the world. The very fact of its existence for more than a century suggest that there is a stable population isolation mechanism. If further studies find this isolation, I think we have a previously unknown sub-species of falcon which still survived in the remote regions of the Altai.

First of all the falcons are distinctly different in having an atypical greyish or ash-grey plumage coloration. A moustache is lacking in some falcons, in others they are very

prominent. The lower part of the body is white with dark-grey spots, which form stripes on the flanks and sides of the body. A young bird examined in June 1998 had a greyish-brown back with a lot of dark spots on the lower part of the body. Some authors mention that the Altai falcon has a dark morph (Sushkin 1938, Dementiev 1951), however it is still not clear as to the degree of intergradation of dark mountain birds and Altai birds. In June 1998 we observed a bird with white colour of the lower part of the body and dark stripes across the tail and upper body.

In the "Falco" breeding centre in Barnaul in 1996 were 2 young Altai falcons taken from the wild. Both birds were large with grey plumage and many spots on the lower part of the body. The Altai Saker is distinct by its short, broad wings, resembling a Gyrfalcon. In the examined female Altai Saker the wing length was 14 mm longer than maximum wing length of the Mountain Sakers (Eastham 1998). Also the tarsi are more than half feathered (Dementiev 1951).



The range of the Altai Falcon is not clearly defined. Dementiev (1951) considered that the range covers many mountain regions of Central Asia. Currently, the Altai Saker no longer occurs in Kyrgisia (Sanin, N., Bachurin, G., pers. comm.). The current situation in Mongolia is unknown, however the country lacks suitable habitat for the Altai Saker. We believe

that the Altai Saker is unique to the Altai-Sayan Mountains in the territory of Russia and Kazakhstan. We observed the bird in Altin-tu, Chulishman, Kurai, and Saylugem mountain ranges. Regular breeding of these birds in the Saylugem mountains was noted by Sushkin (1938). Irisov (1972) mentioned the breeding of the Altai falcon in the Ukok plateau. Some nests are known in the Kurai range (our data) and Tuva uplands (Sanin, pers. comm.).

According to records of Altai falcons during the breeding season and known nest records, these birds occupy the mountain tundra belt of the Russian Altai. Here there is a significant density of Ptarmigan (*Lagopus mutus*), and it is possible to suggest that these birds are the main quarry of this falcon. Possibly the distribution of Ptarmigan determines the range of the Altai Falcon limiting it to the belt between 2,000-2,500m above sea level.

There are no data on the biology of the Altai Falcon. Possibly they breed a bit later than the mountain ones. In the nest found on 14 July 1998 we found 2 unfledged chicks. A similar case of a late brood in Sayan Mountains was mentioned by Dementiev (1951). Later than normal

dates of breeding in Altai Saker could be explained by the late fledging of young Ptarmigan. Under the nest we found a lot of ptarmigan feathers, bones of Northern Pikas (*Ochotona alpina*) and Siberian Chipmunk (*Eutamias sibiricus*). Dementiev (1951) also noted Ptarmigan as diet items. Data with other breeding dates given by Sushkin (1938) probably refers to hybrids, or to Mountain subspecies.

It appears that the Altai Saker has a sedentary way of life and has limited movements within the breeding range. Sudilovskaya (1973) mentioned the only finding of the Altai Saker in North-western China. Then a young female was shot on 15.05.1874 close to Yarkend. Cheng Tso-hsin (1955) mentioned that it is possible to find only birds of *coatsii*, *hendersoni* and *saceroides* in Sindzian province close to the Russian border and does not mention any references to the Altai Saker. During September-October we observed Altai Saker every day in the valleys and plains of the Russian Altai. Seasonal fluctuation of numbers is not well studied, and it appears to be insignificant.

Despite the obvious differences in biology, morphology and geography between the Altai Saker and the rest of the species, it is too soon to make any conclusions on the systematic position of the birds. More studies are needed.

References:

- Cheng Tso-hsin (1955). Distribution list of Birds of China. Peking. V.1.
- Dementiev, G.P. (1951). Birds of the USSR. V. 1. Nauka Publishers.
- Eastham, C. (1998). Satellite tagging of Sakers in the Russian Altai. *Falco*: 12: 10-12.
- Irisov, V.A. (1972). Peculiarities of distribution of some birds in the south-eastern Altai. *Ornitologia* 10: 248-250.
- Kuchin, P.A. (1968). Observation on Siberian Saker in the Upper Ob river. *Ornitologia*, 9: 103-107.
- Stepanyan, L.S. (1975). Composition and distribution of the fauna of birds of the USSR. Non-passeriformes.
- Sudilovskaya, A.M. (1973). Birds of the Tarim basin and surrounding mountains. Studies of the birds of the USSR fauna. Moscow University Press: 50-154.
- Sushkin, P.L. (1938). Birds of the Soviet Altai. Moscow.
- Shekin, B.V. (1965). On the biology of the Mongolian Saker in the Transbaikalia depression. *Ornitologia* 7: 497-498.



Problems of Saker Falcon conservation in Kazakhstan

Anatoliy S. Levin
Institute of Zoology
Kazakhstan Academy of Sciences

Annual monitoring of known nest sites showed that from 1992 the numbers started to decline in a vast region cover-

Falconry has been practised with the Saker Falcon in the republics of Central Asia and Kazakhstan for centuries. Up until recently this falcon inhabited mountainous regions in the south and the east, as well as gallery forests in the north and west of the republic. According to our surveys of the numbers and density of the Saker in 1985 in the environs of Alma-aty, the population of this species was high and was not, by any means alarming. Occupied nests were located 3-5 km from each other. Researchers estimated Saker numbers in Kazakhstan as 2000-5000. Currently the Saker in Kazakhstan is on the brink of extinction. A vivid picture of this decline is shown in the studies by researchers from the Institute of Zoology of the National Academy of Sciences carried out from 1993 to 2000. These studies were financed and carried out as part of the falcon programme run by the National Avian Research Center, United Arab Emirates.



Fieldworkers researching Saker morphology

ing parts of the southern, south-eastern and central parts of the republic. At the moment the total number of breeding birds is estimated as 300-400 pairs. The reasons for the decline was the disintegration of the USSR and opening up of the borders for numerous groups of professional falcon trappers which flooded previously closed territories. Their task was made easier by the lack of any clear conservation and customs legislation, poverty of local inhabitants and corruption in local authorities. Small shipments of falcons from Kazakhstan were known before, but this did not make any difference to the welfare of the population. From 1992 onwards a massive over exploitation of the breeding population began. It is estimated that falcon trappers from Arab countries exported up to 1000 birds annually. Due to various circumstances including the presence of an international airport, relatively good road network and most importantly high breeding density of the Saker Falcon, the most dramatic impact was registered in the south-eastern part of the country, where according to the survey results, the numbers of Sakers declined 8-10 times from 1993 to 1998.

A constant presence in Kazakhstan of professional trappers caused many rumours of an extremely high market value. The rumours were strengthened by the local press and television who acknowledged that the value of Sakers in the markets of Saudi Arabia reaches \$75,000. The extreme poverty of inhabitants who sometimes keep their livestock in the proximity of nest sites in the rural areas, and city dwellers, who possess only a vague knowledge of Sakers, has stimulated a desire to make a quick living. Individuals and groups of trappers using horses, motorcycles, cars, including the most sophisticated and expensive 4wds surveyed the terrain in search of the falcon nest sites.

In 2-3 years the competition between the trapper groups controlling the same territories escalated and they started to take chicks in down. Without any knowledge of captive falcon management these people subject young chicks to extremely bad conditions, hiding the birds in building basements and garages where they suffer from malnutrition. Many of the birds die, most of them lost their market value. After several attempts to sell these birds many of these "businessman" lose hope and simply throw the birds away. There were numerous cases reported when Alma-aty city dwellers picked up flightless, but fully fledged chicks amongst the flat blocks, and passed them to the Alma-aty zoo, or informed newspapers and the Institute of Zoology.


For the researchers working under the NARC project the most extraordinary surprise was the appearance of a falcon in the Alma-aty Zoo in winter 1995, which had been marked by the research team in July with a metal ring, microchip and radiotransmitter. The bird was monitored during the post-fledging period up to the moment of its migration. This suggests that the bird was probably caught during the migration period, and after some months in captivity was worn to exhaustion and thrown away. Being unable to fly the bird was caught by hand in one of the busy downtown parts. There are known cases of broods being stolen from nests in the proximity of Alma-Aty.

According to shepherds living close to the sites, the nest were visited by foreign people. In close proximity to these nests we usually detect car tyre tracks. It is also possible that the broods were stolen by some legal and illegal falconry centres.

The most significant contribution to the decline of the Saker in Kazakhstan was made by local people who switched from the theft of chicks to the trapping of adults. Initially they were using primitive nooses set at the nests or at perch sites. On many occasions this led to the death of the trapped bird as it hangs itself upside down, or smashes itself against the rock. Through contact with people from the Middle East, Kazakhstan inhabitants learned more advanced trapping techniques. In December 1996, employees of the Department of Nature Conservation, Kazakhstan discovered Arabian trapping equipment (pigeon nooses) as well as the pigeon themselves and trapped adult Sakers in the yurts of shepherds. Due to the large demand for large falcons, females started to disappear from the nesting territories from 1996-97 onwards. From year to year the percentage of first time breeders goes up. On the edge of the Sugatinskaya Valley, where the birds have been trapped for 7 years, we recorded a young female with jesses on. Compared to the 1980's, the number of occupied nests on the perimeter of the valley declined from 11-12 to 3-4 nests.

Trapping pressure on the falcons also affected other birds of prey. Most of the illiterate trappers in pursuit of fast money were not able to identify the bird species correctly, and took chicks from the nests of Long-legged Buzzard, Short-toed Eagle, Eurasian and Lesser Kestrels and even eaglets and were trying to sell them as falcons.

Based on the data obtained by the current field project, and on resolutions agreed at the meeting of the Middle East Falcon Research Group in Lahore (Pakistan) in 1998 we worked out recommendations for Saker conservation in Kazakhstan. Together with a report about the critical state of the Saker Falcon populations in Kazakhstan we filed a memo to the Ministry of Biological Resources and Nature Conservation. The Government replied by inviting professional trappers from 4 countries of the Middle East, providing security and free access to the grounds in the Kazakhstan territory and issuing 165 illegal permits for the trapping of adult falcons !

In the winter of 1999-2000 with the participation of the author, a proposal was submitted to the government, which contained a draft of regulations on practical resource management and surveys in accordance with international CITES legislation . The proposal aims to regulate all movements of Sakers within the country as well as their export/import with the microchipping of as many birds as possible. It also intends to increase research and monitoring for the conservation of this species. Ratification of CITES by Kazakhstan this year gives some hope that the government will make an effort for real conservation and will take all necessary measures for conservation of the Saker Falcon as well as other endangered species in 

A Peregrine released during Zayed Falcon Release Project came back to UAE

Kazakhstan.

For the fifth successive year, a large number of Saker (*Falco cherrug*) and Peregrine (*Falco peregrinus*) falcons belonging to United Arab Emirates President His Highness Sheikh Zayed bin Sultan al Nahyan and to other members of the Al Nahyan family were released back into the wild in April 1999.

This year's release is part of a research programme entitled the Sheikh Zayed Falcon Release Project, which was first established in 1995. Involving 38 Sakers and 43 Peregrines, it took place on April 3rd and 4th in the Gilgit District of Pakistan's Northern Areas, a remote and little developed area where three of the world's highest mountain ranges, the Himalayas, the Karakorams and the Hindu Kush meet.

The release was organised under the aegis of Abu Dhabi's Environmental Research and Wildlife Development Agency, ERWDA, with support being provided by the Abu Dhabi Falcon Hospital at Al Khazna, part of the Environment and Wildlife Management Department of the President's Private Department. Help in Pakistan was provided by the World Wide Fund for Nature (Pakistan) and the Falcon Foundation International.

The 79 Sakers and Peregrines, all bred in the wild, had previously been used by President Sheikh Zayed and other members of the Al Nahyan family for falconry during the winter months. Like all responsible Arab falconers, Sheikh Zayed follows a practice of releasing most of his falcons at the end of each season. As a keen supporter of wildlife and conservation, the President now insists that the annual release programme should be designed in such a way as to provide as much scientific data as possible, in the hope that this will help scientists to learn as much as possible about migration routes and the re-integration of the falcons into the wild. Seven of the falcons, including both Peregrines and Sakers, were fitted with small satellite transmitters, to permit their movements to be tracked over the next few months until the batteries run down.

Preparations for the release programme began before the end of the annual hunting season, with the choice of the birds to be released. These were then placed in tightly controlled isolation at the Abu Dhabi Falcon Hospital so that they could be checked for the presence of any bacterial infection and parasites. Blood samples were also taken from each bird to permit full virological studies to be carried out so as to ensure that none were infected with viruses. Only birds found to be completely free of infection were included in the final release programme, to guarantee that there was no chance of infecting the wild falcon population.

To facilitate subsequent identification in the case of

recapture or being found dead, a micro-chip known as a PIT (passive induced transponder), and weighing about 0.1 grams, was implanted under the skin of each bird. Carrying a special identification number, the micro-chip can be detected by passing a special machine over the bird. Besides the PIT, each bird was also fitted with a numbered ring (band) on its leg. Provided by ERWDA, as part of the Emirates Bird Ringing Scheme, each ring has a number and the ERWDA address in Abu Dhabi, so that anyone catching a bird in the wild or finding one dead can report the discovery.

Each bird was then provided with several weeks of daily exercise to prepare it for release in as fit a condition as possible, while the birds were also fed specially to increase their weight, and thus improve their chances of survival during the crucial first two weeks of re-adaptation to life in the wild.



Adult female Peregrine trapped on migration

Finally, in collaboration with the UAE Ministry of Agriculture and Fisheries, the appropriate certificates from the Convention on International Trade in Endangered Species of Flora and Fauna, CITES, were obtained to permit the birds to be exported from the Emirates and to be imported into Pakistan.

One of the most important parts of any release programme is the choice of the release site. In deciding upon the Gilgit area, the team planning the release took several factors into consideration.

Evidence has previously been collected in the Gilgit area showing that it is used as a migration route by Saker and Peregrine falcons moving northwards in the spring towards breeding grounds in central Asia. This evidence was supplemented by information from the 1995 release in Baluchistan and an earlier release in the Gilgit area, in 1996.

Another consideration was the availability of water and

prey species for the released birds. Saker falcons in the wild primarily feed upon small rodents and other terrestrial animals in the wild, of which there is an abundance in the well-wooded river valleys of the Northern Areas, as well as on the higher alpine pastures of the mountains, where spring begins in late March. The Peregrine, in contrast, prefers to take small birds as prey. Available ornithological data suggested to the planning team that there would be a substantial number of small birds in the Gilgit area in early April, both of resident species and of birds on their spring migration northwards.

On the 14th November 1999, a UAE citizen called the Abu Dhabi Falcon Research Hospital to say that he bought a second year male Peregrine, caught two weeks earlier in Pakistan. The bird still had its ring and PIT making him identifiable by Dr. Michael Lierz, Director of the Abu Dhabi Falcon Research Hospital, as one of the birds released in Pakistan in April. When it arrived at the Falcon Hospital, the bird was checked and found in excellent condition. Its moult and physical condition were similar to a wild falcon.

This excellent news is showing the success of the Sheikh

Zayed Falcon Release Project as falconry birds can successfully reintegrate in the wild population if well prepared, in good physical condition and released at the appropriate time. Data from the satellite transmitters also showed that this bird probably spent all the time in the vicinity of the release site in Gilgit, demonstrating the suitability of this region of Pakistan to return falconry birds to the wild.

The first release programme for President Sheikh Zayed's falcons took place in April 1995, when a total of 107 falcons were released in the Kharan District of Pakistan's western province of Baluchistan. Succeeding years saw releases in the Gilgit District in 1996 and in the Lake Issyk-kul area of Kyrgyzstan in 1997 and 1998. In all, a total of 398 falcons, all but two of them Sakers and Peregrines, have been released during the five years of the programme.



Captive Peregrine returns to breed successfully in the Arctic

John Quinn
EGI, Department of Zoology
University of Oxford
England, OX1 3PS

Last summer Yakov Kokorev and I spent two months 600km above the Arctic Circle in Siberia. Our aim was to microchip as many young Peregrines (*Falco peregrinus calidus*) as possible to assist NARC's ongoing attempts to estimate trapping pressure on the falcons as they migrate through central Asia and the Middle East en route to their wintering grounds.

In mid-August we came to one sandy cliff on a river on the Taymyr Peninsula. As soon as we climbed to within 20 metres of the eyrie, the aggressive female, stooping frequently to within 1 metre of our heads, revealed that she was no ordinary falcon. She herself had already been 'tagged', not with a ring by a biologist, but with subqu jesses by an Arab falconer. 'Sabooka' had obviously been lost or escaped while hunting in Arabia, only to return to breed in the wild. As if this were not remarkable enough, one of the young we micro-chipped from Sabooka's eyrie that day was trapped two months later in the gulf between Al Khafji and Al Jubail. We know this only because the person who trapped and later hunted the young female, then took her to a falcon hospital for a clinical examination. The hospital checked for a PIT microchip implant and the bird's identity was revealed.

As rewarding as this single recovery is, we need more feedback from hospitals throughout the Middle East. Our

data has shown us so far that the population seems to be recovering well from the pesticide-induced declines of the 1960-1980 period. We also think that a substantial, but not necessarily harmful, proportion of the young population is taken each year.

Sabooka has another valuable lesson to teach us. Taking a falcon from the wild does not necessarily have an impact on the population. The fate of most falcons at the end of each hunting season on the Arabian peninsula seems to be uncertain but the trapping of the young female from the Gulf last October surely demonstrates what it should be.

References:

Eastham, C., J. L. Quinn, & N. Fox (2000). Saker (*Falco cherrug*) and Peregrine Falcons (*Falco peregrinus*) in Asia: determining migration routes and trapping pressure. In Proceedings of the Vth World Conference on Birds of Prey and Owls, Johannesburg, 4-11 August 1998 (B. U. Meyburg and R. D. Chancellor, Eds).

Quinn, J.L. & Y. Kokorev (2000). Direct and indirect estimates of a Peregrine Falcon population size in northern Eurasia. *The Auk* 117(2):455-464.

Quinn, J. L., Y. Kokorev, J. Prop, N. Fox and J. M. Black. (2000). Are Peregrine Falcons in Northern Siberia still affected by organochlorines? In Proceedings of the Vth World Conference on Birds of Prey and Owls, Johannesburg, 4-11 August 1998 (B. U. Meyburg and R. D. Chancellor, Eds).



DNA-based sex identification of falcons and its use in wild studies and captive breeding

Marie-Ann D'Aloia
National Avian Research Center
PO Box 45553, Abu Dhabi, UAE

Christopher Eastham
The Falcon Facility, UK

The National Avian Research Center's (NARC) Saker Falcon Conservation Program is divided into two areas: the Falcon Breeding Program and the Falcon Research Program. The Breeding Program aims to produce falcons (Saker, Peregrine, Gyr, Gyr/Saker and Gyr/Peregrine hybrids) for Arab falconry and in turn, reduce the pressure on wild populations. The Research Program has two main areas: basic research into falcon biology and the monitoring of wild populations in countries such as Kazakhstan, Russia, Kyrgyzstan, Mongolia, Pakistan and China. Information gathered from the monitoring projects is crucial for conservation management plans. The productivity of wild falcon populations and the numbers of wild-caught birds trapped for falconry provide estimates for the sustainable harvest of falcons for Arab falconry.

Knowing the sex of a falcon is important for a number of reasons. When conducting research on wild populations of falcons, the productivity and ratio of males to females produced by adult birds should be assessed. Sexing of chicks in the nest is also useful for studies such as growth data, dispersal and migratory behaviour. In captive breeding programs the sex of an individual must be known in order to establish natural breeding pairs and for the early imprinting of young falcons for artificial insemination techniques.

Sexing adult falcons is usually a straightforward task due to reversed size dimorphism and can be accomplished using

external body measurements and/or plumage differences. Sometimes, however, during the first few weeks after hatching and occasionally, when fully grown, sex identification can be difficult and conventional techniques become subjective. One possible method to identify the gender of birds can be achieved using their DNA. This uses the differences in the chromosome allocation in the sexes, where the females are the heterogametic sex (ZW) and the males homogametic (ZZ). Therefore, a previously described PCR technique was applied employing two primers (P2 and P3) followed by site-specific restriction digestion to sex the Saker, Peregrine, Gyr and Gyr/Saker hybrid falcons. Using these methods, distinctive patterns are apparent for males and females making it possible to accurately identify their sex. This will have important uses both in captive breeding and in field research.

This technique has proved to be convenient and simple for the sex identification of Saker, Peregrine, Gyr and Gyr/Saker hybrid falcons. Unlike sexual dimorphism, this method is age independent, so adults, juveniles and chicks can be sexed. The test is accurate, and only nanogram quantities of DNA are required. In addition, only a small amount (e.g. 10 µl) of blood is required or a feather sample as a source of DNA. This will be useful in the management of avian captive breeding programs, such as those at the NARC, making it possible to apply specific rearing techniques and start imprinting from an early stage. Blood samples can be taken during routine handling, so minimal additional stress is imposed on the birds. In addition, it can also assist the ecological research on wild birds where chicks and juvenile birds are often difficult to sex.

Health considerations of illegally traded houbara for falcons and falconry in the Middle East

Tom Bailey, Olivier Combreau, Francois Lampen and Silvanose, C.D.
National Avian Research Center, PO Box 45553
Abu Dhabi, UAE

The houbara bustard has a high conservation profile in the Middle East because it is the traditional quarry of falconers in Arabia. A number of regional conservation projects, such as the Houbara Bustard Captive Breeding and Restoration Programme of the National Avian Research Center (NARC), Abu Dhabi, have been initiated by influential Arab falconers to safeguard both the bustard and their tradition.

There is a large illegal trade in free-living houbara bus-

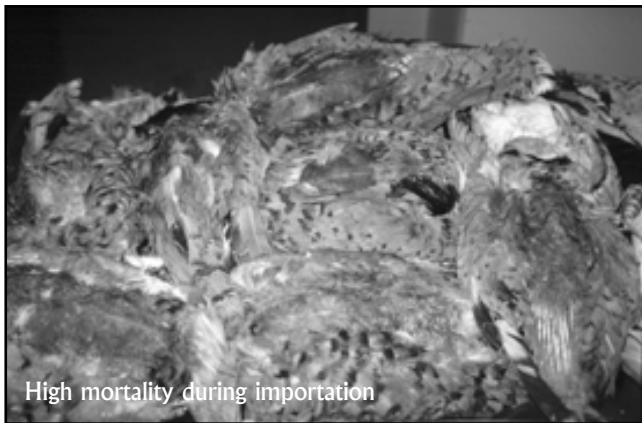
tards, trapped in the eastern wintering grounds which are exported to the Middle East where they are used by some falconers to train their falcons. It has been suggested that 4,000-7,000 houbaras are traded in this way from Pakistan each year (Goriup, 1997), but accurate information on the flow of birds from other countries is unknown. Some conservationists are concerned that this trade may have more impact on the status of the houbara bustard than direct hunting with falcons.

The United Arab Emirates (UAE) is a signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and although the importation of free-living houbara bustards was banned in 1993 (Anon, 1993), the illegal trade continues. In 1998 initia-



tives were taken in Abu Dhabi and Sharjah to confiscate illegally imported houbara bustards when they entered the UAE, while in Pakistan government agencies actively confiscate birds as they are smuggled out of the country through air and sea ports. Attempts to rehabilitate and release these birds back into suitable habitats have also been initiated in Pakistan (Ahmed, 1997) and in the UAE at NARC. Recently, during the 1999-2000 season 27 confiscated houbara bustards that had received medical treatment at the NARC quarantine unit were released in the UAE. Four of them were monitored using satellite telemetry as part of a pioneering rehabilitation project.

The illegal trade in wild animals is known to be wasteful wherever it occurs. The trade in houbara bustards is no exception and entire shipments are known to die after importation into Gulf countries. Mortality of confiscated flocks is known to approach 50% in some rehabilitation centres and during the 1999-2000 season mortality of 263 birds that entered the NARC quarantine unit was 68% (Lampen, unpublished data). Some birds arrived in such emaciated condition that cannibalism was observed, a very distressing sight for staff who were involved in caring for these birds.



A comprehensive review of the infectious diseases of illegally traded houbara bustards has recently been completed at NARC (Bailey *et al*, 1999). The high mortality seen in houbara bustards is associated with poor transport conditions, extreme malnutrition, overcrowding and exposure to multiple infectious diseases, in particular *Chlamydia* sp., aspergillosis, avian pox and paramyxovirus type 1 virus. Other pathogens include *Salmonella* sp., *Pseudomonas* sp., *Trichomonas* sp., intestinal endoparasites, avian leucosis, reovirus, adenovirus and paramyxovirus type 2. This health information will be used to improve the medical management of the birds before they are released into the wild or integrated into captive flocks according to IUCN guidelines (IUCN, 2000).

This illegal trade affects all parties who are interested in promoting the sustainable use of houbara bustards because it represents;

- An important welfare problem for houbara bustards, which also presents a negative image to Arab falconry.
- A wastage of free-living houbara bustard populations with

fewer birds available for sustainable falconry activities. Basically every wild bird that enters the illegal trade is one less bird that can be caught on a hunting trip.

- A potential disease risk to falcons when these unhealthy and diseased birds are used either for training or as 'bagged' quarry. In the survey at NARC 4.1% of recently confiscated houbara bustards were shedding PMV-1 virus and 56% were serological positive to PMV-1 indicating recent viral exposure. Similarly *Chlamydia* sp. antigen could be detected in 25.3% of birds while 51% were serologically positive. Both of these conditions are important causes of mortality and morbidity in falcons in the UAE and the use of illegally traded houbara during the training period is a potential route for transmitting infection to falcons.

- A potential disease risk to free-living houbara bustard populations if smuggled birds are released by falconers to supplement birds in hunting grounds. These diseased birds have the potential to mix with and contaminate healthy wild houbara. The introduction of disease into free-living houbara populations could similarly have a negative effect on the number of birds available for hunting.

- A disease risk to captive-breeding bustard populations when confiscated birds are incorporated into the numerous unofficial breeding projects in Gulf countries without medical screening.

- A potential threat to human health from pathogens such as salmonellae, *Giardia* sp., and *Chlamydia* sp.

- An important health risk to poultry production in the Middle East. The illegal trade in wild-caught species bypasses international veterinary regulations and is a well known cause of spreading infectious diseases that damage livestock industries in other countries.

Veterinarians working in the Middle East should be aware of the potential health risks that these illegally traded houbara bustards pose to falcons through the wide spectrum of diseases that these birds are infected with during the trade cycle. Veterinarians also play a role in disseminating public health information and falconers should be made aware that these illegally traded houbara bustards are important carriers of zoonotic diseases such as *Chlamydia* sp., *Giardia* sp. and *Salmonella typhimurium*. Political solutions will ultimately end this trade, but until this happens those of us working with the falconers have a responsibility to promote sustainable falconry practices, which will ultimately benefit the houbara, falcons and ensures the sustainability of falconry. The authors would be interested to hear information on this topic from readers of Falco.

References:

Ahmed, M. (1997) Houbara Foundation International Pakistan. *Arabian Wildlife*, 3, 13-15.

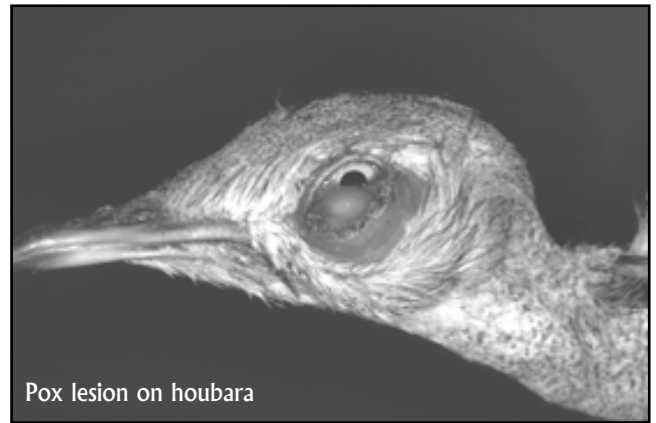
Anon. (1993) Cabinet orders houbara ban. *Emirates News*. 16th November.

Bailey, T.A, Silvanose, C.D., Naldo, J., Combreau, O., Launay, F., Wernery, U., Kinne, J., Gough, R. and Manvell, R. (1999) Health considerations of the rehabilitation of illegally traded houbara bustards *Chlamydotis undulata*

macqueenii in the Middle East. European Association of Avian Veterinarians Conference, Pisa.

Goriup, P.D. (1997) The world status of the houbara bustard *Chlamydotis undulata*. Bird Conservation International, 7, 373-397.

IUCN. (2000) IUCN guidelines for the placement of confiscated live animals. IUCN/SSC Re-introduction Specialist Group. IUCN, Gland, Switzerland.



Pox lesion on houbara

Editors note: This issue of Falco publicises the NARC houbara bustard ringing programme. All houbara bustards that are officially rehabilitated in the UAE are also fitted with a NARC metal band ring. Similarly, birds that are rehabilitated from the Houbara Foundation International Rehabilitation Centre in Pakistan also have metal band rings. Ring returns by hunters and falconers from these rehabilitated birds are extremely valuable in providing data on migration routes and survival. All ring returns will be treated with strictest confidence.

The houbara bustard population ecology programme at the National Avian Research Centre, Abu Dhabi.

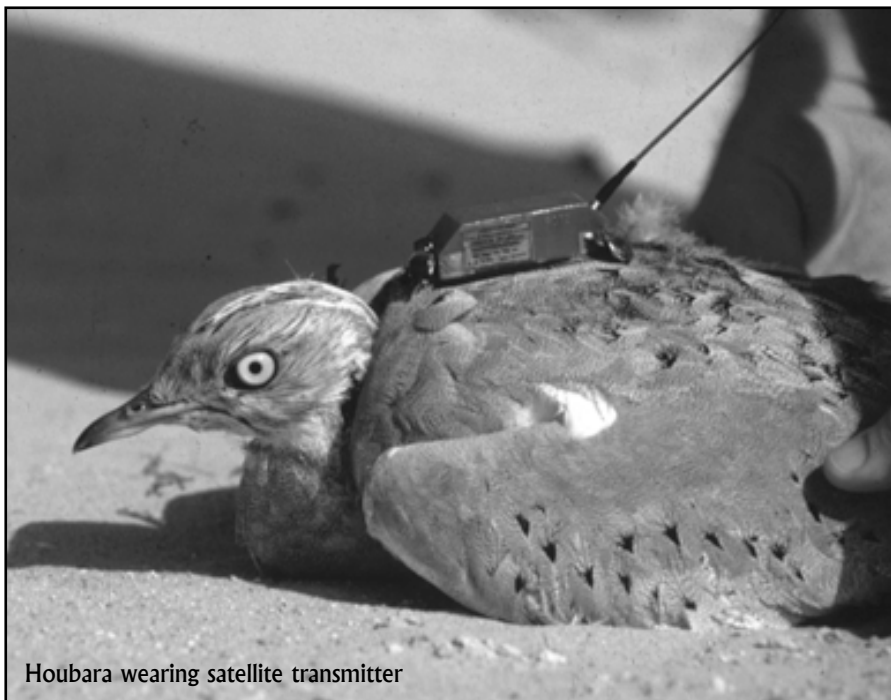
Olivier Combreau and Mark Lawrence
NARC/ERWDA, PO Box 45553, Abu Dhabi, UAE
Tel: +971(3)7347555, fax: +971(3)7347607
e.mail: ocombreau@erwda.gov.ae
mlawrence@erwda.gov.ae

Since 1993, the National Avian Research Centre in Abu Dhabi has been conducting research on the houbara bustard population ecology. This ambitious work is intended at understanding the population dynamics of this species in Asia and is resolutely applied to the conservation of the houbara and to the sustainability of falconry. Acknowledging the wide distribution range of the species in Asia and their migratory status, it soon became clear that efforts to conserve or boost the houbara population in the UAE would be futile if factors limiting their numbers occur elsewhere. To have a clear picture of the population dynamics of this bird, the field of investigation should not be limited to the UAE only but on the contrary be extended to the whole area inhabited by the Asiatic houbara.

In that respect, NARC has developed a network of collaborators within the houbara distribution range to help defining the best conservation strategy for this bird. In Asia, NARC collaborates actively with The Anti-Plague Research Production Association in Kazakhstan, The Xinjiang Institute for Ecology and Geography in China, The National Wildlife Research Centre in Saudi Arabia, The Office of the Adviser for Conservation of the Environment in Oman and Houbara Foundation International in Pakistan. With the help of our Central Asian colleagues, NARC organises long-term expeditions on the Central Asian breeding grounds during which we assess the variations in houbara densities over years and collect information on the breeding success and the survival rate of this bird.

To clarify the level of the houbara population, NARC is working for the last 4 years at monitoring the trends in houbara populations all over Asia. Networks of observers developed by NARC in Kazakhstan, in China and in the United Arab Emirates start to bring important first-hand information on houbara population changes over years. By counting birds using similar methods in subsequent years it is possible to detect changes in population density. NARC had embarked on long term houbara population monitoring in both China and Kazakhstan. Since 1998, NARC is using the network of field researchers of the Kazakh Anti-Plague Research Production Association to count houbara in spring and in autumn. In China, researchers of the Xinjiang Institute for Ecology and Geography participate in bi-annual houbara census since 1997. The ultimate objective of these collaborations is to provide data on the changes in population densities in the long term.

Owing to the satellite tracking technique, NARC has been able to follow numbers of houbara bustards to and from their breeding grounds in Asia. Birds wintering in the UAE go to different regions for the summer including Afghanistan, Kazakhstan and China, and often do not return all the way to the UAE in the following season. Therefore, it seems that birds from several geographically separate breeding populations can (but don't always) winter in the UAE. In the extreme south of the distribution range like in the UAE, there is no or little fidelity to the wintering site and this explains why bedu have long observed great variation in houbara numbers between years. Similarly, the satellite tracking technique showed that houbara wintering in East Pakistan may be regular breeders in northern Afghanistan, Kazakhstan, China and Mongolia. On the wintering grounds, there is always a mix up of houbara from different breeding populations. Houbara bustards breeding in eastern Kazakhstan were



Houbara wearing satellite transmitter

found to winter in Iran and in Pakistan whereas houbara from western Kazakhstan flies to southern Iraq and northern Saudi Arabia. Chinese houbara are long-migrant birds that may winter in a range stretching from East Pakistan to U.A.E. Invariably, after the wintering season, groups of houbara wintering in a given site split and each returns to its own breeding ground to which they show great fidelity. The satellite tracking technique has also allowed us to extend further east and further north the known distribution range of the houbara, and today several areas of Central Asia appear to have substantial populations of houbara that were previously not considered to be significant. Moreover, this new technology contributed a lot to under-

standing the mortality factors during migration and wintering.

When combined, this information allows us to estimate the production of the houbara population in Asia and this is important because, obviously, a population will only survive if long-term production (measured by breeding success) is equal to, or greater than, long-term losses (measured by individual survival). To achieve good results, it is important for us to collect as much information as possible with the greatest possible accuracy and falconers and falcon veterinarians participating in hunting parties could help us gathering data.

It is of prime importance that we are informed whenever and wherever a houbara with a ring or a transmitter is caught. In addition, to express its full potential, NARC's ringing programme

would also require that the total number of houbara captured during the hunting party that caught a ringed bird is also relayed to us. Another aspect of the houbara ecology that is difficult to assess for us but that could be easy for falcon veterinarians is the control of the health status of houbara caught during hunting parties. We invite falconers and falcon veterinarians participating in hunting parties to collaborate with us in order to promote a sustainable use of the houbara and thus to secure a bright future for the Arabian art of falconry.



Control of Endemic *Caryospora* species Infestation of Captive Raptors

Neil A Forbes BVetMed Dip ECAMS FRCVS
Avian and Exotic Animal Department, Clockhouse
Veterinary Hospital, Wallbridge, Stroud, Glos. UK

Caryospora spp. infestation is a major cause of morbidity and mortality of captive bred and wild caught raptors. The author has been researching the incidence and methods of detection, as well as chemotherapy and management control for several years. Effective methods of controlling this coccidian parasite have enabled the production of parasite free offspring from endemically infected breeding facilities. In the future, it may be possible to generate an immunity against infestation in healthy wild caught and captive reared falcons.

Introduction

The genus *Caryospora* comprise cyst forming protozoal parasites belonging to the 'true' coccidia (phylum Apicomplexa, class Sporozoa, subclass Coccidiasinia, order Eucoccidioria, sub-order Eimeriidae) (Upton, 1990).

Caryospora spp. infestation has previously been reported as causing significant morbidity and mortality in falconidae (Forbes & Simpson, 1997). Although infestation has been demonstrated in wild raptors (Kluh, 1994; Upton et al, 1990; Lindsay & Blagburn, 1986), it has been reported to have a greater incidence in captive raptors (Forbes & Simpson, 1997; Kluh, 1994; Boer, 1982; Heidenreich, 1995). The presence of coccidial oocysts from various investigations in captive and wild falcons is presented in Table 1.

The source of the birds and the level of infestation of their parents affect the incidence of faecal oocysts in any captive bird survey. However, the age of the birds (Boer, 1982; Heidenreich, 1995) is responsible for the greatest variance. The majority of *Caryospora* spp. infestations in captive birds are acquired directly (Stockdale & Cawthorn, 1981), i.e. definitive host to definitive host, as opposed to indirect routes (Upton, 1990). Most clinical disease and the incidence of high levels of shedding is found in birds less

than 5 months of age, but may also be seen in older immune naive birds, in particular if they are concurrently immune compromised. The incidence of faecal shedding in wild birds is related to the rate of ingestion of relevant intermediate or paratenic hosts (Upton, 1990), frequently rodents, by the birds sampled. Various therapeutic regimes have been previously recommended for the control of clinical disease (Kluh, 1994; Boer, 1982; Heidenreich, 1995), but the author and others (Kluh, 1994) have observed a poor response to therapy. Clinical signs associated with *Caryospora spp.* infestation in raptors include abdominal cramps, fluffed up appearance, weight loss, inappetance, vomition, brown or occasionally haemorrhagic diarrhoea while in merlins clinical disease is frequently characterised by severe diarrhoea or acute death in birds between 28 to 45 days of age (Forbes & Simpson, 1997).

Table 1. Prevalance of *Caryospora spp.* in captive and wild falcons.

Prevalence (%)	Number of samples	Country	Year	Source	Reference
12	461	Germany	1982	Captive	Boer, 1982
79	86	Germany	1994	Captive	Kluh, 1994
26	1158	Saudi Arabia	1999	Captive	Samour, pers comm
24	75	UK	1997	Captive	Forbes & Simpson, 1997
16	876	UK	1997-1999	Captive	Forbes & Fox 2000
9	254	UK	2000	Captive	Forbes & Fox 2000
31	16	USA	1986	Wild	Lindsay & Blagburn, 1986
0	247	Germany	1998	Wild	Krone, 1998
0	75	UK	1997-2000	Wild	Forbes & Fox 2000

It is widely accepted that coccidiosis is difficult to control due to persistence of infective oocysts in the environment. Young birds are most likely to ingest oocysts prior to 20 days of age, but do not to show clinical disease until after 28 days of age (Forbes & Simpson, 1997). It has been shown that the prepatent period for *Caryospora* infestation in falcons is 9 to 13 days and that if the birds are treated in this period they will not only develop a partially or completely protective (depending on host and parasite species) immune response but that they will not shed oocysts (Kluh, 1994).

Therapeutics

Common therapeutics used against coccidiosis in falcons have not lead to satisfying results (Kluh, 1994). Previously recommended therapies for avian coccidiosis have involved 50 -150mg/kg po or i/m sid 5 to 7 days, amprolium for 6 days at 30mg/kg, or amprolium in combination with ethopabate at a dose of 0.5mg/kg sid for 5 days. More recently clazuril 5 - 10mg/kg po sid has been recommended, at doses ranging from 7.5mg - 25mg/kg on one or two consecutive days (Forbes & Simpson 1997, Heidenreich 1995). It is recognised that thiamine deficiency may occur in birds suffering from coccidiosis due to vitamin utilisation by the parasite. Furthermore that hypovitaminosis may worsen leading to thiamine responsive fits when such birds are treated with amprolium (in the absence of concurrent thiamine supplementation).

Treatments Used In This Study

In this survey (conducted in the United Kingdom) the following therapeutic regimes were tested: clazuril 7.5mg/kg po

sid 3 days, toltazuril 8mg/kg po once, toltazuril 20mg/kg po once, toltazuril 25mg/kg po on 2 consecutive days, toltazuril 25mg/kg po once plus movement of the bird to a previously uncontaminated area, toltazuril 25mg/kg po daily x 2 followed by sulphonamide for 5 days at 50mg/kg po sid, or toltazuril 25mg/kg po once weekly for 3 weeks. All positive cases, irrespective of level of excretion, were assigned to different treatment regimes. Subsequent faecal samples were monitored on a monthly basis. Response to therapy was assessed by repeated monthly faecal analysis following treatment. Long term monitoring is essential in determining the true efficacy of treatment for *Caryospora spp.* infestations of falcons. Temporary cessation of shedding is commonly seen with a number of agents, but is typically not maintained. Treatment of falcons with *Caryospora spp.* infestation is necessary not only to prevent clinical disease but also in an attempt to reduce the level of oocyst contamination of the aviary.

Results

Eight hundred and seventy six samples were examined from 168 captive falcons. One hundred and forty six (16.7%) of samples were positive, with 56 (33%) of the birds testing positive on at least one occasion. Fifty five percent of the breeder sites were positive on at least one occasion during

the study period. The highest rates of shedding occurred during 8 to 24 weeks of age, which is synonymous with the period of most sever clinical signs, also leading to the highest level of environmental contamination. Rates of shedding were increased in adult birds during the breeding season, which led to increased oocyst contamination of the rearing site. This seasonal increase in shedding was also demonstrated in non-breeding birds. The only treatment regime which demonstrated any significant long term efficacy was toltazuril 25mg/kg once weekly for three weeks, which was significantly more efficacious than the same dose on two consecutive days. Although it is accepted that the control of coccidiosis is dependent on good hygiene as well as medical and/or immunological control, moving birds to a clean environment 24 hours after 2 treatments with toltazuril, a reportedly effective treatment regime (Kluh, 1994), did not improve success rates over medication alone. In a breeding collection that had suffered 70% incidence of clinical disease in the previous breeding season, a total of 45 young birds were target treated at 21 and 35 days of age. Four and a half percent of these birds did demonstrate infestation although this did not occur until 100 and 105 days respectively, by which stage they had been under their new keepers care for a period 30 days. The remaining birds demonstrated no clinical signs or faecal oocysts of *Caryospora spp.* No oocyst shedding was found in 15 young birds, foster or hand reared from infested parents that had previously produced infested offspring.

Discussion

This survey has been field based and inevitably the experimentation has been hampered by the death or loss whilst flying of study birds and by the failure to maintain sample collection by some keepers. The results add weight to the view previously expressed (Forbes & Simpson, 1997) that the *Caryospora* is refractory to therapy during certain stages of the parasite life cycle. Other workers have demonstrated the development of variable levels of immunity and duration of patency with different *Caryospora* spp. in different falconidae host species (Kluh, 1994; Lindsay & Blagburn, 1986; Heidenreich, 1995). In this study oocyst shedding by juvenile birds has been maintained for longer than previously reported species (Kluh, 1994; Lindsay & Blagburn, 1986; Heidenreich, 1995), indicating a slower or less complete development of immunity. The intermittent nature of oocyst shedding by infested birds indicates that sample collection over a three day period has a greater chance of detecting positive cases. Kluh (1994) treated 16 kestrels (25mg/kg toltazuril) and none demonstrated any abnormalities in general health, faecal consistency, feeding, moulting or behaviour. In this survey, a small minority of birds demonstrated reduced flight ability and general malaise, a slight croakiness and change of vocalisation for a period of up to 48 hours following a single oral administration of 25mg/kg. However, no birds showed any significant or long term effects and this therapeutic agent is considered safe in this species at doses up to 25mg/kg administered by mouth. In this survey infestation of breeding birds has been eradicated in many cases as judged by repeated faecal monitoring and oral therapy which enabled *Caryospora* free offspring to be produced. The use of parasite free foster parents or hand rearing has also enabled parasite free offspring to be produced. The process of allowing or creating *Caryospora* infection in young birds and treating them during the pre-patent period shows promise as a clinical technique to produce un-infested young birds with immunity against the parasite. However, such a control method is reliant on young birds being naturally exposed to the parasite. As successive generations become less infested, so does the chance of natural exposure reduce.

Future Control Methods

In falcons *Caryospora* is more commonly 'genus specific' rather than 'species specific', in view of this it is conceivable that a live precocious or irradiated attenuated polyvalent vaccine could be produced to protect all falcon species. It is perceived that young captive bred birds would be treated at the breeding site, whilst wild caught birds would be vaccinated shortly after capture. Although the disease is primarily one of captive bred birds, wild caught immune naïve birds are at risk once they are mixed with captive bred birds.

Samples Required

With this project in mind samples (or information on species encountered in practice) are requested in order to determine which species of *Caryospora* might be included in such a vaccine. Clinicians are requested to harvest oocysts (by flotation in saturated salt, collection of the

surface layer) and storage in 2% Potassium Dichromate at 4°C. If this is totally impossible, faecal samples can be well mixed in 2% Potassium Dichromate and stored at 4°C, although using this method there may be significant oocyst degradation. Samples may be batched and forwarded to the author.

References:

Boer, B. (1982) Untersuchungen über das Vorkommen von Kokzidien bei Greifvögeln und über die Entwicklung von zwei *Caryospora*-Arten der Falken (*Caryospora neofalconis* n.sp. und *Caryospora kutzeri* n.sp.). Dissertation from Institut für Parasitologie der Tierärztlichen Hochschule Hannover.

Forbes, N.A. & Simpson, G.N. (1997) *Caryospora neofalconis*: An emerging threat to captive-bred raptors in the United Kingdom. *Journal of Avian Medicine and Surgery* 11: 110 - 115.

Forbes, N.A. & Fox, M. (2000). Control of Endemic *Caryospora* species Infestation of Captive Raptors. In: Proceedings of the Association of Avian Veterinarians Annual Conference. AAV, Lake Worth, Florida.

Heidenreich, M. (1995) *Birds of Prey: Medicine and Management*. Blackwell Science. Oxford.

Kluh, P.N. (1994) Untersuchungen zur Therapie und Prophylaxe der *Caryospora* Infektion der Falken (Falconiformes: Falconidae) mit Toltazuril sowie die Beschreibung von zwei neue *Caryospora*-Arten (*C. megafalconis* n sp und *C. boeri* n sp) *Vet Med Diss.* Hannover.

Krone, O. (1998). Endoparasiten (Faunistik, Epizootologie, Pathogenität) Bei wildlebenden Greifvögeln aus drei Verschiedenen Gebieten Deutschlands. *Dissert Veterin.* Universität Berlin.

Lindsay, D.S. & Blagburn, B.L. (1986) *Caryospora uptoni* n sp. (Apicomplexa: Eimeriidae) from Red-Tailed Hawks (*Buteo jamaicensis borealis*). *Journal of Parasitology.* 72: 762-765.

Stockdale, P.H.G. & Cawthorn, R.J. (1981) The coccidian *Caryospora bubonis* in the Great Horned Owl (*Bubo virginianus*). *Journal of Protozoology.* 28: 255.

Upton, S.J. & Sundermann, C.A. (1990) *Caryospora*. In: Long PL.(ed). *Coccidiosis of Man and Domestic Animals*. CRC Press. Boca Raton, Florida. 187-204.

Upton, S.J. *et al.* (1990) The Eimeriidea (Apicomplexa) of raptors: review of literature and description of new species of genera *Caryospora* & *Eimeria*. *Canadian Journal of Zoology.* 68: 1256-65.

Peter McKinney
Wildlife Protection Department
P.O. Box 27942
Dubai, United Arab Emirates



Amyloidosis in falcons in the United Arab Emirates

During the last few years I have noticed an increased incidence of amyloidosis in falcons, especially gyr and gyr-hybrid falcons. Most of the cases are at the later stages of the disease with a poor prognosis, but it is interesting to note the different chronic diseases that are associated with the development of amyloidosis. Diseases that are seen in association with amyloidosis include chronic pododermatitis (bumblefoot), severe crop trichomoniasis, chronic aspergillosis, chlamydiosis.

What is amyloidosis?

Amyloid is a fibrillar protein derived from immunoglobulins. It is often associated with constant inflammatory stimuli e.g. inflammatory rheumatic conditions or familial Mediterranean fever in humans. Amyloidosis denotes a pathological tissue change due to the deposition of amyloid proteins. Amyloid is insoluble and almost resistant to proteolysis, so when it is deposited in tissues it cannot be eliminated, resulting in tissue destruction. Symptoms vary according to the organ most affected by the amyloidosis and sites of amyloid deposition include the liver, kidney, spleen and vascular walls of the gastrointestinal tract (leading to protein loss and malabsorption).

Clinical signs of amyloidosis include:

- Rapid weight loss with normal appetite. The mutes are normal until terminal stages.
- Lime green discoloration of the urate portion of the mutes. Often the falcon can be in excellent body condition
- Abnormal feather moult.
- Exercise intolerance.

Laboratory diagnosis

1. Bile acid levels are often markedly high-often greater than 200umol/l.
2. Endoscopic examination shows a green tinged swollen liver with a wax-like appearance. The spleen is often discoloured and swollen.
3. Biopsy either with endoscopic sample retrieval or wedge biopsy.
4. Histological examination demonstrating the amorphous, eosinophilic amyloid that on Congo red staining shows a green birefringence when viewed under polarised light.

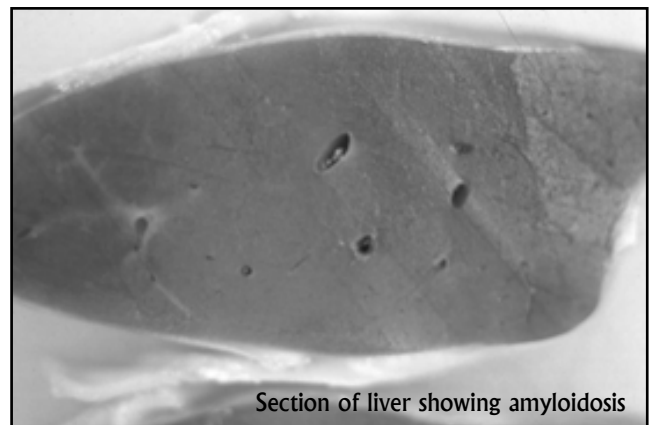
Case history

A one-year-old gyr-saker falcon hybrid was presented in poor body condition with a large trichomonas mass approximately 4cm in diameter in the crop. The falcon was hospitalised and responded to supportive therapy and treatment with Vitamin A, carnidazole and metronidazole. A complete physical examination including liver function tests, radiography and endoscopy showed no other problems. The crop lesion resolved and after five weeks the falcon was discharged.

Six months later the falcon was presented by the owner who noticed that although in good body condition, when fasted for two days the urates developed a dark-green colour. Examination revealed a swollen, firm liver margin

readily palpable below the sternal border. Radiography showed severe hepatomegaly. A wedge section of liver was surgically removed and histological examination demonstrated advanced hepatic amyloidosis. Bile acid and AST levels were high and total protein and albumen levels were low, but haematology values were within normal ranges. A Chlamydia antigen test was negative. A poor prognosis was given and the falcon was discharged, but treated with Silymarin 1 capsule s.i.d (Simepar:Mepha) for one month.

Six months later the falcon is still alive, although an abnormal feather moult is evident. The liver is still palpable and firm, but the urates are white, body condition is good and the bile acid levels are within the normal range!



This case illustrates several points:

1. Falcons can suffer from advanced amyloidosis, yet appear “normal”! In a moulting or breeding chamber amyloidosis may not be noticed. Only when the bird is caught for training and there is an obvious exercise intolerance will the problem be evident.
2. Haematology and biochemistry values may not always identify a problem.
3. Any chronic inflammatory disease requiring long-term veterinary care has the potential to trigger amyloidosis. Although seen in peregrines and saker falcons; Gyr falcons and gyr-hybrids appear to be more susceptible to amyloidosis.

A dilemma now unfolds! It is possible that some low-grade amyloidosis cases are not detected in hunting falcons. Does the clinician now have to consider liver biopsy as part of the veterinary health screen of older birds? I am now interested in measuring serum amyloid A (SAA) levels in falcons. Further research is needed in this area, but it may reap important benefits for the veterinarians working with falcons.

I would be interested to hear the views of colleagues on this topic.



Letters to the Editor

Parasites in Lanner Falcons

Dear Sir,

While removing a lead pellet from a male lanner falcon using endoscopy, several medium sized worms could be seen in the distal oesophagus. These were retrieved, stored in an ethanol/glycerine solution and sent to Dr Lynda Gibbons, Royal Veterinary College, London for identification. Dr Gibbons informed me that the specimens belonged to the genus *Physaloptera*, but that she could not identify them to species, since all the specimens were females. A couple of weeks later, and again examining a male lanner falcon, similar specimens were retrieved, stored and sent for identification. I am pleased to say that this time, male and female specimens were available for identification. The specimens were identified as *Physaloptera alata alata* (Rudolphi 1819). The worms were 35-40 mm in length and 1-1.5 mm in diameter. An invertebrate host is necessary to complete its life cycle. I would be interested to know if other Falco readers have found similar parasites in lanner falcons.

Dr Jaime Samour



Observations on the use of Azithromycin in Falcons

Dear Sir,

Chlamydiosis in all bird species remains both a diagnostic and therapeutic challenge to avian veterinarians, even though new (antigen capture) ELISA's and PCR technology allow more sensitive detection of *Chlamydia* antigens than ever before. The intermittently shedding, clinically normal carrier (possibly lifelong) remains a grey area of diagnosis and management for all of us. New antibiotics, with improved, longer-term tissue levels than those previously available, hold promise for significant advances in this regard.

Azithromycin (Zithromax®, Pfizer Inc) is an erythromycin-derivative of the Macrolide class of antibiotics. This agent acts by interfering with microbial protein synthesis on the ribosomal level, and demonstrates effective therapeutic levels in all organs against a remarkable range of micro-organisms including a wide range of gram positive and gram negative organisms, as well as some protozoans (Azithromycin product data sheet, Pfizer, UK). In humans it has been used successfully for treatment of toxoplasmosis, borreliosis, malaria, cryptosporidiosis, urogenital and respiratory chlamydiosis and *Mycobacterium avium* infections. Clearly there are a plethora of possible applications in Avian Veterinary medicine, but at this time a serious lack of controlled studies in birds.

Clinicians at Falcon Hospitals in Dubai have thus empirically divided 250mg Azithromycin capsules into 3-5 equal amounts, giving these in equal portions per os with variable amounts of food over the same number of days "per falcon". This translates roughly into a dose of 50-80mg/

kg. Most falcons receiving these dosage regimens displayed transient inappetence and lethargy during treatment, but also a noticeable improvement in clinical condition after its completion.

From an examination of human pharmacodynamic information (Pfizer Inc website:www.pfizer.com), as well as pilot studies by Limoges and co-workers (1998; 1999) on Azithromycin tissue levels in Amazon Parrots and Cockatiels, the following possible improvements on current empirical Azithromycin therapy in falcons against *Chlamydia psittaci* infection can be suggested:

1) The administration of the capsule formulation with food resulted in a 52% reduction in rate of absorption (C_{max}) as well as 43% reduction in extent of absorption (AUC=area under curve), compared to without food. The tablet and oral suspension formulations' parameters were unaffected and are thus possibly more useful for avians.

2) Adult and pediatric data are based on 500mg on D1, with 250mg OID D2-5 for adults and 10mg/kg on D1, with 5mg/kg OID D2-5 for children. These demonstrated efficacy against *Chlamydia pneumoniae* ("Community acquired pneumonia complex"), bacterial pneumonias (*Haemophilus sp.*, *Moraxella sp.*, *Streptococcus sp.*) and skin infections (*Staphylococcus aureus*). Treatment regimens at the low dose only needed a few days to reach stable maximum tissue levels. This suggests the need for a loading dose.

3) It is recommended that urethritis/cervicitis due to *Chlamydia trachomatis* are treated with a single 1000mg dose per adult (+/-14mg/kg) while the same syndromes due to *Neisseria gonorrhoeae* are treated with a single 2000mg dose per adult (+/- 8mg/kg), giving effective tissue levels for an adequate period of time (7 days+) in both instances.

Similar single-dose-per-week approaches would seem both potentially effective and very desirable from a practical point of view for avian treatments, compared to previous longterm Doxycycline therapies, but client education to ensure that this takes place for outpatients would also be essential!

4) The most commonly reported side-effects (<5% of patients) were diarrhoea, nausea and abdominal pain. Are the side-effects that are observed in falcons related to over-dosage?

5) Both Psittacine studies suggested comparable pharmacodynamics to the human data. A single 40mg/kg dose of Azithromycin pediatric oral suspension in cockatiels resulted in tissue concentrations (lung, liver, kidney) on D1, 2, 3, 5 and 7 post treatment that far exceeded the mean inhibitory concentration (MIC) of Azithromycin for an avian strain of *C. psittaci* (determined in vitro). Even though other *C. psittaci* strains might have different MIC's, other avian species slightly different bioavailabilities and the tissue distribution to diseased tissue may be different

from distribution to healthy tissue, paucity of data forces us to extrapolate from the above. Several treatments of falcons with chlamydiosis at a suggested dose of 40mg/kg, once a day with food using either the tablet or oral suspension formulations of Azithromycin, on a weekly interval basis, would seem to be a logical starting point. Due to the long-term carrier state associated with *Chlamydia* infections, and to accommodate the traditional 30 day quarantine period, four weekly treatments are suggested until new information allows further improvements.

6) The suggested dosages for Erythromycin in standard Avian Medicine textbooks vary from 40-80 mg/kg to 40-80 mg/lb (!?).

I would like to acknowledge stimulating discussions on this topic with my Dubai colleagues: Dr Alok Sharma, Dr David Remple and Dr Peter McKinney. Falcon and other avian veterinarians are invited to contribute to this discussion either through the pages of "Falco" or to me directly: Verwoerd@emirates.net.ae

References:

Limoges, M.-J. *et al.* (1998) Plasma pharmacokinetics of orally administered azithromycin in mealy amazons (*Amazona farinosa*). Proceedings of the Association of Avian Veterinarians. 41-43.

Limoges, M.-J. *et al.* (1999) Azithromycin tissue levels in cockateils (*Nymphicus hollandicus*). Proceedings of the Association of Avian Veterinarians. 441-443.

Editors note:

Allometric scaling can be used to extrapolate the dose of Azithromycin used in humans (1000 mg once a week) to a one kilo non-passerine bird (see Sedgwick, 1993) and provides a dosage regimen of 45 mg/kg given per os every 52 hours. While the dosage interval is probably too short based on existing tissue distribution studies, it is reassuring that this allometric scaled dose rate is comparable to the doses that are being used to treat falcons.

See Sedgwick, C.J. (1993) Allometric scaling and emergency care: the importance of body size. In: M.E. Fowler (editor), Zoo & Animal Medicine, Current Therapy 3. WB Saunders Company, Philadelphia, USA. Pp 34-37.

Dr Dirk Verwoerd
Sheikh Butti Al Maktoum Wildlife Centre, Dubai

Serratospiculiasis in birds of prey

Dear Sir,

As you all probably know, serratospiculiasis is a major problem in birds of prey in certain parts of the world. This is particularly true with falcons in the Middle East. There are seven different species within this genus. The prevalent species in the region appears to be *Serratospiculum seurati* as identified on several occasions from different falcon species by Dr L. Gibbons, formerly at the International

Institute of Parasitology, St Albans, UK. *Serratospiculum* spp. are also found in Central and South East Asia, Australia, North Africa, Eastern Europe and other localities of the world. Species likely to be found in these geographical areas include *S. tendo*, *S. chungii*, *S. turkestanicum*, *S. guttatum*, *S. kwangiensis* and *S. congolensis*. The parasite was originally designated as *Serratospiculum amaculata* in the USA and it has now been allocated to a different genus and it now denominated *Serratospiculoides amaculata*. *Serratospiculum* worms are filarial nematodes that inhabit the lungs and air sac system of the final host. We have been involved in the study of the life cycle of this parasite for several years now and are in the position to provide concrete answers concerning transmission and intermediate hosts. There are currently studies underway concentrating on the development of the L3 to adulthood and the interaction of the parasite with the host.

For treating, or more appropriate, for the control of this parasite several drugs have been proposed and vary from the use of ivermectin at one single dose to the use of fenbendazole for up to 14 consecutive days. Many people stopped using ivermectin because of the mixed results obtained and have gone to try other compounds. We have been involved in a major exercise over the last five years using ivermectin at different dosages, using different routes and using different falcon species. I am not going to bother you with all the details and to make a long story short, we are now using the subcutaneous route and administering ivermectin at 1 mg/kg (this is 0.1 ml full strength Ivomec subcutaneously). A second dose a week later is advisable, as one single dose is not completely effective. The dose most commonly published of 200mcg/kg is good enough to get the filarial nematodes out of the air sac walls so they can be removed surgically through endoscopy. A procedure widely used by many clinicians in the Middle East. We are also assessing the use of levamisole (Thank you Neil Forbes for suggesting this), again subcutaneously, but we will not be in a position to come up with any solid results for at least another season.

I would appreciate if anybody outside the Middle East has any experience with filarial worms of this genus and what treatment protocol has been attempted.

Your assistance would be greatly appreciated,

Jaime Samour
Fahad Bin Sultan Falcon Centre
P.O. Box 55
Riyadh 11322
Kingdom of Saudi Arabia
Phone/Fax No. 00966-1-4567723
email address: falcon@shabakah.com

What's new in the literature?

Below is a list of some recently published papers which are directly relevant to articles published in this or previous issues, or which may be of interest to working members of the MEFRG. It is not intended to be a comprehensive review of the literature. We acknowledge the help of Mrs Catherine Tsagarakis from NWRC, Taif for her help in conducting this literature search.

Britten, M.W. et al. (1999) Performance and accuracy evaluation of small satellite transmitters. *Journal of Wildlife Management* 63(4): 1349-1358.

Recent technological advances have resulted in small (30 g) satellite platform transmitter terminals (PTTs) that can be used to track animals with masses as little as 900-1,000 g. While larger PTTs (>80 g) often yield locations accurate to within hundreds of meters, the location accuracy of smaller PTTs has not been tested. We did these tests while using the PTTs to document migration routes and nonbreeding areas of American Peregrine Falcons (*Falco peregrinus anatum*). We PTT-tagged 42 female Peregrines from 2 breeding areas. Only 2 of the PTTs failed prematurely (4.7% failure rate). Active PTTs (i.e. PTTs on live birds that eventually stopped transmitting due to battery exhaustion) averaged 280 transmission hours for 1993-94 (n = 3), 380 transmission hours for 1994-95 (n = 7), and 430 transmission hours for 1995-96 (n = 15). To estimate location accuracy of poor-quality locations, we compared Argos-estimated locations with known locations of 11 rock doves (*Columba livia*) tagged with PTTs. The location types with the highest precision averaged 4 km from the true location, while the location types with the lowest precision averaged 35 km from the true location. The results indicate the PTT locations were sufficient to document animal movements over broad spatial scales such as identifying migration routes and non-breeding areas of birds.

Dressen, P.J. et al. (1999) Effects of isoflurane anesthesia on hematologic and plasma biochemical values of American kestrels (*Falco sparverius*) *J. of Avian Medicine and Surgery* 13(3): 173-179.

The effect of repeat blood sampling and anesthesia on hematologic and plasma biochemical values of American kestrels (*Falco sparverius*) was investigated. Of the analytes measured, only the pack cell volume (PCV) value significantly decreased. In a second study of 29 kestrels, hematologic and plasma biochemical values were compared before and after 10 minutes of isoflurane anesthesia. Only the changes in uric acid and potassium values could be attributed to the effects of anesthesia. Age, sex, and weight-related effects were also observed for selected values. The combined effect of isoflurane anesthesia and repeat blood sampling causes more dramatic changes in analyte values than repeat sampling alone. Therefore, both the method and frequency of blood sample collection in kestrels must be considered when interpreting blood values.

Ellis, D.H. , & Lish, J.W. (1999) Trash-caused mortality in Mongolian raptors. *Ambio* 28(6): 536-537.

On four expeditions through Mongolia (1994, 1995, 1997, 1998) mortality associated with trash gathered by parent raptors as part of nest building was found. The observations were limited to three species: Golden Eagle (*Aquila chrysaetos*), Saker Falcon (*Falco cherrug*) and the Upland Buzzard (*Buteo hemilasius*).

Korbel, R. et al. (1999) Investigations on fluorescein angiography in raptor eyes. *Tierärztliche Praxis Ausgabe Kleintiere Heimtiere* 27(6): 396-407.

Fluorescein angiography (FAG) is the observation of distribution of fluorescein solution within the blood stream following intravenous injection. The aim of the present study was to adapt the examination procedure to the special needs of the avian patient. For this purpose the fundi of 43 ophthalmologically healthy raptors (nine different species) were documented. Taking serial photographs provided a complete image of the normal fundus for reference reasons. In the intubated raptors under isoflurane anaesthesia, 40 mg/kg BW fluorescein-sodium (10% solution) were administered via the superficial ulnar vein. The distribution of the dye within the vasculature of the fundus was documented over time. Using FAG in birds the diagnosis of subtle haemorrhages of the pecten and choroid, atrophy of vessels and the retinal pigment epithelium as well as retinal detachments and other diseases of the fundus will be improved.

Krone, O. et al. (2000) Protozoa in the breast muscle of raptors in Germany. *Acta Protozoologica* 39(1): 35-42.

Seventy-nine raptors from Germany were examined for protozoan parasites in the breast muscle. The sarcocyst found in a long-eared owl is the first proof for a *Sarcocystis* sp.

Lierz, M. et al. (2000) Isolation of *Mycoplasma meleagridis* from free-ranging birds of prey in Germany. *Journal of Veterinary Medicine Series B - Infectious Diseases and Veterinary Public Health* 47(1): 63-67.

In this study tracheal swabs and air sac biopsies of 68 raptors of different species that were found injured or debilitated in Germany were investigated for the occurrence of mycoplasmas. *Mycoplasma meleagridis*, *Mycoplasma falconis*, *Mycoplasma buteonis*, *Mycoplasma gypis* and five mycoplasma isolates not identified so far could be isolated from 32 (47 %) birds. *Mycoplasma meleagridis* could be detected in five birds. These birds did not show clinical signs or histopathological alterations in air sac biopsies related to the infection.

Remple, J.D. (1998) Considerations on the Production of a "Safe and Efficacious" Falcon Herpes Vaccine. 3rd International Raptor Biomedicine Conference, South Africa.

Falcon herpesvirus (FHV) is a fatal disease of presumably all members of the genus, *Falco*. Because of the virulence displayed by FHV and the serologic and genetic similarity to pigeon herpesvirus (PHV), it is generally believed that

pigeon herpesvirus is the potential etiology for fatal herpesviral (FHV) disease in falcons. Since pigeons are a major food source for falcons and play an integral role in their training, there is strong interest in the production of a FHV vaccine to protect falcons. Modified live herpesviral vaccines are thought to be the most efficacious; however, they may present risks to host and wildlife contracts. Undesirable consequences of live herpesviral vaccines can be viral shedding by vaccinates and reversion to virulence of the vaccine virus strain. Therefore, the 'safe' alternative would focus on an inactivated vaccine, which is capable of mounting an effective cell-mediated immune response.

Samour, J. H. (2000) Supraorbital trichomoniasis infection in two Saker Falcons (*Falco cherrug*). *Veterinary Record* 146: 139-140.

Two Saker Falcons were admitted to the Falcon Medical and Research Hospital of the Fahad bin Sultan Falcon Centre in Riyadh, Saudi Arabia for clinical examination. The clinical history included reduced appetite, progressive weight loss, partial obstruction of the nostrils (nares), fluttering of the skin over the infraorbital sinuses, unilateral ocular discharges and severe unilateral supraorbital swelling. Direct wet smears and stained preparations confirmed the presence of the flagellate *Trichomonas gallinae*. The two birds were treated with metronidazole at a dose rate of 50 mg/kg for five consecutive days. In addition the falcons were administered enrofloxacin at a dose rate of 15 mg/kg twice a day for five days and general support therapy. The affected sinuses were flushed daily through the nares using 0.1 ml chlorhexidine diluted to 10 ml with sterile saline solution. Seven days after the therapeutic regimen was started it was decided to carry out exploratory surgery on one of the falcons and a caseous mass was removed. The same surgical procedure was repeated on the second falcon. The supraorbital swellings were completely reduced by the fifth day after surgery and recovery was uneventful for both birds. The supraorbital trichomoniasis lesions described in this paper portray an unusual clinical finding and it is proposed that trichomoniasis infections should also form an integral part in the differential diagnosis of supraorbital swellings in falcons.

Wernery, U. et al. (1999) Production of a falcon herpesvirus vaccine. *Berliner und Munchener Tierarztliche Wochenschrift*. 112: (9) 339-344.

Ten Common Kestrels (*Falco tinnunculus*) were used for this falcon herpes vaccine experiment. Four kestrels were subcutaneously given 1 ml of an attenuated falcon herpesvirus that had originally been isolated from the liver of an American Prairie Falcon (*Falco mexicanus*). Another 4 kestrels were given subcutaneously an inactivated falcon herpesvirus vaccine derived from the same American field strain. This vaccine was concentrated, inactivated and emulsified in complete Freund's adjuvans. Two further kestrels served as controls and were not vaccinated. Twenty-one days after vaccination, all 10 kestrels were challenged with passage 3 of the American falcon herpesvirus. The 2 control kestrels died 6 days after challenge and 3 of those given the inactivated herpes vaccine died 9 days after challenge, with typical lesions of herpesvirus inclusion body hepatitis. Before the vaccination experiment, all 10 kestrels were free of serum

neutralising antibodies to the falcon herpesvirus. Twenty-one days after vaccination, all 4 kestrels vaccinated with the attenuated vaccine, and one vaccinated with the killed vaccine, had seroconverted, having shown no symptoms to the challenge with a low passage virulent American herpesvirus strain. Following the challenge their antibody titres to falcon herpesvirus increased. No herpesvirus was isolated from any of the cloacal swabs taken during this experiment, indicating that there is no danger for any other birds from the attenuated herpesvirus vaccine. This experiment clearly shows that an attenuated falcon herpesvirus vaccine can protect kestrels from fatal inclusion body hepatitis.

Conference Announcements

Veterinary Conservation Biology: Wildlife Health and Management in Australasia

July 2-6, 2001

Taronga Zoo, Sydney, Australia

Sessions on conservation biology, wildlife utilisation, wildlife recovery and reintroduction programmes, wildlife health. Please contact Program Convenor:
Dr Larry Vogelnest, Taronga Zoo, PO Box 20, Mosman NSW 2088, Australia. Ivogelnest@zoo.nsw.gov.au

6th International Congress of the European Committee of the Association of Avian Veterinarians (EAAV) in collaboration with the German Veterinary Society (DVG) and in conjunction with the 4th International Scientific Meeting of the European College of Avian Medicine and Surgery (ECAMS)

March 7 - 10, 2001

Munich, Germany

The Congress will cover oral presentations, posters and various practical labs covering scientific progress on practical aspects of avian medicine and surgery and related topics. Authors interested in presenting a paper are encouraged to submit an informative abstract (max. 1 page). Deadline for submission of original abstracts in English per E-mail (doc- or txt-files) is July 31st, 2000.

Submission address and further information:
Ruediger T. Korbelt, DVM, PhD, Associate Professor at The Raptor Center
College of Small Animal Sciences
University of Minnesota / United States
E-Mail: Rkorbelt@tc.umn.edu