



FALCO

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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.

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.

FALCO online

Previous issues of FALCO can be referred to at:

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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 current issue covers a wide range of topics. It begins with a summary of the recently held Second International Conference of the Middle East Falcon Research Group. The first conference was held in Abu Dhabi in 1995 and since then some projects have been completed, new ones have begun while some are still ongoing. It is often the poorer countries where conservation problems need to be addressed and these same countries where resources for field research programmes are scarce. Many of these fieldworkers are volunteers and thanks are very much due to the sponsors of the Environmental Research and Wildlife Development Agency and the National Avian Research Center, Abu Dhabi in making it possible for most of the fieldworkers to attend this meeting. In particular thanks are due to H.H. Sheikh Khalifa bin Zayed Al Nahyan, H.H. Sheikh Mohammed bin Zayed Al Nahyan, Mohammed Al Bowardi and Majid Al Mansouri for making this event possible. Having the majority of fieldworkers in the same place at the same time was quite an achievement especially as some had to cut their field seasons short in order to attend.

Conference is not really an appropriate word to use. It was very much a working group meeting where the emphasis from the MEFRG has always been to have practical sessions on relevant falcon and houbara problems and to use these discussions and results of previous research to plan the way ahead. How often do we attend conferences and spend the final day writing resolutions that have no further outcome? The extent of the Saker and Houbara range is so great that it is a difficult juggling act to spread the available effort and resources across all the regions and at the same time ensure that the most critical areas are dealt with sooner rather than later, or worse, too late. This year ERWDA published a strategy plan to conserve falcons and houbara demonstrating the organisation's commitment to the sustainable management of these species. In fact the full title of the publication is 'A global strategy for the conservation of falcons and houbara'. The word 'global' immediately demonstrates the enormity of the task in hand.

This issue of FALCO provides a clear example of how rapidly a species can decline and how finding solutions involves international cooperation drawing on professional expertise from a range of disciplines. We refer here to the plight of vultures in India. Although not directly related to Middle East falconry, this report makes us realise the increasing pressures on free-living populations and cannot

but make us feel sad for these magnificent birds. MEFRG members scattered in the Middle East and in Central Asia should be aware that this problem in *Gyps* vultures may one day spread beyond the Subcontinent and into our own backyard. Perhaps it is time for regional monitoring of our vulture populations?

The MEFRG is a close group of workers from many different disciplines. We work with veterinarians, field biologists, geneticists, media and politicians. Look at the index of subjects covered in this and previous issues and you will see many areas of science and conservation. This is why we as MEFRG members should consider ourselves lucky. We have help close at hand, we can draw upon resources at relatively short notice and we have individuals with many different areas of expertise who are prepared to jump in when required. Let's not leave it too late.

News from the mews

This season has seen the departure of two members of the MEFRG from the UAE for personal reasons. Dr Michael Lierz has returned to Germany and Dr Dirk Verwoerd has returned to South Africa. They will be missed by the veterinary community of the Emirates and we would like to wish both of them well with their respective futures and thank them for their help and scientific contributions to the MEFRG and FALCO over the last few years.

The Editors



Satellite transmitter on Mongolian Saker

Second International Conference of the Middle East Falcon Research Group, Ulan Baatar, Mongolia.

Nigel Barton

From 1-4 July 2000 the MEFRG held a meeting in Ulan Baatar to discuss the present situation with regard to falcon and houbara bustard projects being sponsored by the National Avian Research Center (NARC) as part of the Environmental Research and Wildlife Development Agency (ERWDA), Abu Dhabi. The conference was attended by MEFRG members currently involved in projects and by representatives of various international wildlife organisations and was opened by the State Secretary for Nature and Environment of Mongolia, Mr S. Banzragch and Mr Majid Al Mansouri on behalf of Mr Mohammed Al Bowardi as representative for ERWDA.

Since the days of Chingis Khan, the saker falcon (*Falco cherrug*) has been a symbol of Mongolia and the efforts currently being made in the country to encourage sustainable use of natural resources made it an ideal location for a working meeting. However, in protecting a species which is used in falconry it is equally important to manage the

Majid Al Mansouri, Brig. Ahmed Mukhtar and Mohammed Saleh.

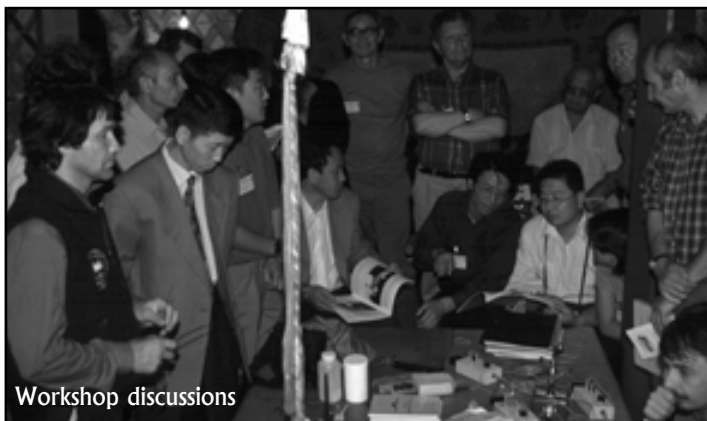


prey species, in this case the houbara bustard (*Chlamydotis undulata*) and the meeting allowed workers on both the predatory and prey species to exchange ideas and work towards a common goal of protecting both species, but at the same time allowing their sustainable use. This year saw the publication by ERWDA of 'A Global Strategy for the Conservation of Falcons and Houbara' which outlines a plan for the sustainable use of these species.

After a brief introduction by Dr Nick Fox on the international saker falcon programme representatives from the various attending countries gave reports on the status and conservation aspects of saker and houbara. Full abstracts are online at www.falcons.co.uk/MEFRG/

Mongolia

Acad. Shagdarsuren gave a history of saker research in Mongolia. Recent research results suggest a population size of about 3,000 pairs, with almost 10,000 young being produced. This is an increase from 1998 estimates, but from surveys in 2000 it seems that numbers have once



again fallen. Field teams led by D. Sumya, S.Gombobataar and E. Potapov have made repeated surveys over 5 study areas. The use of conventional telemetry satellite transmitters is providing information on range use and movements of adult and fledgling falcons. Eugene Potapov described nest site selection in Mongolian sakers and stressed the importance of nests on artificial substrates (55.3%) compared with those on cliffs and rock ledges (44.7%). From results, brood size does not differ between artificial or natural nest sites unless influenced by unseasonal weather. Reports were also given on diet studies and wintering of the saker. It seems that a proportion of the breeding birds also winter in Central Mongolia.

According to A. Bold the houbara bustard has declined in Mongolia, where it is at the northern and eastern extremes of its range. Scientists from NARC have already begun surveying areas in collaboration with local Mongolian scientists in an attempt to determine the limiting factors and assess more accurately the houbara population in Mongolia.

Russia

Valery Moseikin bravely tackled the Altay falcon in myth or reality and I am sure this debate will continue for many more years. Vladimir Galushin summarised the population status of sakers in European Russia, or rather the population decrease. The main reason seems to be the decline of their principal food source, the suslik. However, there seems to now be a recovery of suslik populations which hopefully will result in a return of the saker to previous breeding areas in European Russia. Kuchin and Zubakina reported on the saker in the Chuya Steppes which adjoins western Mongolia. This area has also seen a decline over the past 20 years due to low prey availability and illegal trapping of falcons. Vitaly Ryabtsev reported on Baikal District and *F. c. milvipes*. In this region there seems to have been a decline from 300 pairs in the early 90's to around 60 pairs at present. Running for a few years has been a study of Peregrine numbers in Taymir where Yasha Kokorev and John Quinn have been studying population dynamics and from an estimated 400 pairs in the late 80's numbers seem to be increasing.

Kazakhstan

Anatoli Levin described the critical state of the saker population in Kazakhstan. Surveys in 2000 showed a dramatic decline mainly due to trapping and nest thefts. Total estimates for the country are 150-200 pairs. Initially the southern part of the country was most affected and then pressure moved to the east, all this despite Kazakhstan being a CITES signatory. Despite recommendations from researchers on current population levels, advice seems to fall on deaf ears and illegal trafficking of falcons continues with government approval. In the north of the country the problem is less severe. E. Bragin reported a stable population despite evidence from microchipping data that there is trapping in the wintering areas. Nigel Barton gave an overview of the microchipping scheme and its use in monitoring falcons during import and export.

Pakistan

Brigadier Mukhtar Ahmed described the work of the Houbara Foundation International in establishing breeding and rehabilitation centres to augment populations of houbara in Punjab and Balochistan Provinces. He described the detrimental effects that trapping of live houbara is having. Education awareness programmes are being established to try and involve communities more in habitat and species conservation.

Ukraine

In southern Ukraine, Vitaly Vetrov reported the saker to be stable at 50 pairs, nests being located along the Black Sea Coast and Crimea mountains. Birds are the principal prey. At present there are thought to be about 140 pairs of sakers in eastern and southern Ukraine. Trapping and persecution seems to be relatively low with Peregrines also increasing in this region.

Kyrgyzstan

Surveys by Shukurov and Davletbakov show the region to be important during migration and for breeding. There are no accurate estimates for population numbers. In the eastern part of the country there are thought to be about 50 pairs with fewer in the west. Trapping and trade is high and an estimated 80% of nests are robbed.

Uzbekistan

Elena Kreuzberg-Mukhina reported the saker population to be relatively stable at 100-150 pairs. Human pressure has recently increased with a greater number of adults being trapped from the population. The population is being supplemented with captive-bred falcons produced in a centre in Uzbekistan and currently the total wild population does not seem to be showing any decline.

China

The largest population of sakers is found in China. Falcons have breeding and wintering ranges in the country but due to the vast area it is difficult to arrive at accurate estimates for the true population size. As in most other countries the saker suffers from habitat loss and persecution, but since the early 1990's there has been a large increase in smuggling, despite China being a CITES signatory. According to Chief Wan Ziming and Ye Xiaodi there is an increasing demand for Chinese sakers, prices are rising and whereas the main port of export was Beijing, falcons are now being smuggled through many different ports in the country with over 1,000 birds being confiscated between 1992-95. Since 1997, legal exports have been allowed in an attempt to try and reduce legal activities. It is hoped that NARC will become more involved in research on Chinese sakers in the next few years.

There were several papers given on the International Trade of Falcons and Houbara. Tom Bailey covered many of the health aspects and described some of the infectious diseases which are apparent in houbara being trapped and transported. He also stressed the need for awareness when captive-breeding projects return birds to wild populations to ensure that 'novel' diseases do not enter the wild population. Results of a questionnaire completed in the Middle East falcon hospitals enabled estimates of numbers of houbara which are live trapped each year. Fred Launay expressed his concern for the houbara situation concluding that if falconry is to continue in the Middle East then this will be determined not by falcon numbers but by whether or not measures can be implemented across many countries to ensure the survival of houbara in reasonable numbers.

Practical session with Dr Tom Bailey



During the meeting a number of workshops were given to enable fieldworkers to gain some experience in field procedures. Tom Bailey demonstrated simple health screening and preparation of blood samples and Nick Fox and Eugene Potapov demonstrated morphology measurements, microchipping and transmitters. There was plenty of opportunity for audience participation.

Thanks to the organising committee from the Mongolian Protection Agency of S. Banzragch, D. Shijirmaa, Acad. Shagdarsuren and Prof. Sumya and to Dr. Nick Fox, Dr. Eugene Potapov and Dr Fred Launay from the National Avian Research Center.

David H. Ellis



Recent History of Saker Falcon Studies in Mongolia

USGS Patuxent Wildlife Research Center,
HCR1 Box 4420, Oracle, AZ 85623 USA

We are indebted to O. Shagdarsuren (2000) for his chronicle of the 19th and early 20th century ornithological expeditions in Mongolia. From these he provides some detail on the seasonal distribution of the saker (*Falco cherrug*). Additional expeditions are cited by Meyburg and Meyburg (1983).

It is the purpose of this report to describe the recent studies that focused specifically on the saker. The first articles on the saker falcon in Mongolia actually focused not so much on the saker *per se* as on the systematics of the enigmatic Altay falcon or Altay gyrfalcon (formerly *Falco altaicus*, *F. lorenzi*, *F. cherrug altaicus*, or *F. rusticolus altaicus*). Early in this controversy, specimens of large falcons from the Sailugem mountain range in the Russian Altay, between Mongolia (Bayan Olgii Imag) and the Altai Autonomous Region of the Russian Federation, were pivotal in this controversy (Sushkin 1938). Academician Shagdarsuren himself participated in the century-long and continuing debate over systematics of this bird. In his article with Dementiev (Dementiev and Shagdarsuren 1964), they argue convincingly that the Altay falcon could not be a species separate from the saker because each Altay falcon morph has a saker morph counterpart and there seems to be an uninterrupted continuum in color variation between the Altay falcon and saker morphs across Mongolia.

Many authors before and since have contributed fuel to this debate. Moseikin (2000) argues that there is indeed a separate population of large falcons (i.e., the Altay falcon) inhabiting the upper elevations of the Altay and Sayan Mountains. This bird is reportedly larger than the saker and may forage on different prey. Three recent studies were based primarily on museum skins. The first two reported that much of the evidence linking the Altay falcon with the gyrfalcon stems from the fact that a number of specimens labeled Altay falcon (either *lorenzi* or *altaicus*) are in fact gyrfalcons that were migrants to southwestern or south-central Siberia (Ellis 1995, 1996). Those papers also showed that all of the Central Asian (i.e., non-Siberian) summer specimens that were the most gyrfalcon-like were from a much more restricted area (i.e. only the region of the Russian Altay Mountains and the Sayan Mountains) than reported in previous publications. They also concluded that there is a smooth continuum between the saker and the "Altay gyrfalcon." In the third paper, which is also the most detailed morphometrics study, Eastham (2000 unpubl.) agreed that there is a continuum between sakers and Altay falcons and that the two should be considered synonymous.

Of field studies focused on the saker in Mongolia, the first included a 4000 km long survey conducted by Baumgart (1978a, b). He reported color morphs of adults and observations of a few nesting pairs near Ulanbaatar. All but one of these pairs nested in trees. A final pair bred,

he believed, on a ruined building, a phenomenon that has become well known for Mongolia (Ellis *et al.* 1997, Potapov *et al.* 1999a). In 1994, following Baumgart's work, a study of the nesting ecology of the saker falcon in Mongolia began, continuing through to 1998. In total, over 150 breeding territories were found with over 200 eyries described.

Reproductive performance over two seasons and unusual breeding situations have been described (Ellis *et al.* 1996, 1997). Many nests were in odd situations and were also composed of man-made materials including cloth, wire, and twine brought by the original builders, ravens (*Corvus corax*), black kites (*Milvus migrans*) or buzzards (*Buteo sp.*). Birds sometimes became entangled in twine and cloth and either died or would have died without intervention (Ellis and Lish 1999, Potapov *et al.* 1999b).

Novel social behavior including the first documentation of siblicide for any falcon (Ellis *et al.* 1999) and a 'splayed-toes-flight display' (wherein adult falcons present their weapons to territorial intruders) have been described. In 1994, 1995 and 1997. Prey remains were gathered from about 200 eyries (unpubl.).

Aware that saker populations in Kazakhstan were plummeting due to over harvest for falconry (Levin 2000) and seeing a growing harvest in Mongolia, artificial eyries were constructed in 1997. The first year 65 artificial nests were created (Ellis *et al.* 1998). Some active nests were modified to better suit the falcons. Although many nests were destroyed by winter winds, in 1998 several of the 1997 nests were occupied by sakers.

In 1998 there was a great expansion of saker field work by Mongolian students and scientists after NARC supported a study by the Environmental Protection Agency, Mongolia. Their cooperators included the Ministry of Nature and the Environment, Mongolia State University, and the Mongolian Academy of Sciences. Those efforts resulted in an immediate estimate of the breeding population (Shijirmaa *et al.* 2000). Continuing work (Shagdarsuren 2000) promises to provide good information on home range (Potapov 2000), food habits (Gombobataar *et al.* 1999), productivity, and other aspects of saker biology (Potapov *et al.* in prep). Fieldworkers are indebted to the National Avian Research Centre and the Environmental Research and Wildlife Development Agency, Abu Dhabi for funding and continuing to support this ongoing work and to the Environmental Protection Agency, Mongolia for their support.

Editor's note: an interesting aspect of Saker breeding biology which has recently been discovered and which would no doubt increase the accuracy of breeding population estimates for Mongolia is the discovery of true ground-nesting pairs of sakers (Potapov and Fox in prep). Past estimates have been based on power line surveys, and areas above ground level. Nests have previously been discovered at cliff

bases (Ellis *et al.* 1997) but not in open areas. Surveys in open steppe are far more time-consuming but might reveal interesting densities of ground-nesting sakers. In this issue of *Falco* there is a short summary of the recently held conference in Ulan Baatar. For a complete overview of Saker Studies in Mongolia we look forward to the proceedings of the II International Conference on Saker Falcon and Houbara Bustard which are now in press. Some information is already available on the web at www.falcons.co.uk/mefrg/conference.htm

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Saker falcon protection in Eastern Europe

Dr Laco Molnar
Dubai Falcon Hospital
PO Box 23919, Dubai

The Pannon lowland (the present territory of Hungary, the former Czechoslovakia and Rumania) surrounded by the Carpathian mountains has always been a suitable environment for Saker Falcons to exist in Europe. However, the falcon population critically declined during the 1960's and 1970's. It was this decline that initiated a conservation project aimed at restoring the Saker population to original levels. Their existence is limited by the availability of suitable nesting sites, hunting territory, prey species abundance and human interference.

Presently, the largest Saker population is found in Hungary, and this is reflected in the cultural legacy of the nation. Hungarians occupied the territory of their state 1100 years ago as a united nation consisting of 7 nomadic central Asian tribes. The legend of their leader, Arpad, depicts him as the offspring of a holy bird, Turul. Nowadays the name, Turul, is still the synonym for Saker Falcon. The silhouette of a falcon is found on monetary notes, and the Saker is popularly depicted in many aspects of Eastern European culture. Today the Saker is protected by law, and the keeping of Sakers or Saker hybrids in captivity is strictly prohibited.

Sakers occupy the same regions as Imperial Eagles. They have often been observed using the abandoned nests of eagles and other raptors to raise their young. An advantage of this nest sharing is the similar food requirement that raptors of a given region share. It has been found that the diet of Saker nestlings consists largely of a small marmot-like rodent, the souslik (*Citellus citellus*). This information of nest sharing and common food species formed the basis of a wide spread conservation program to re-establish the Saker population.

The initiative of the Saker Falcon recovery program was taken by non-governmental volunteers, enthusiasts and ornithologists. In the beginning, large nesting boxes (80 x 80 x 80cm) were installed in places where migratory or solitary resident falcons had been observed. Boxes were mounted in solitary trees and on high power line pylons, up to 45m in height. If possible, nesting boxes were located within 2-4 km of large colonies of sousliks. The next step was to establish a suitable food source (sousliks) in localities where nesting boxes had been installed, but where natural prey was insufficient to sustain Saker families. This was achieved by translocation and reintroduction of sousliks to new farmlands. The areas chosen were mainly open pasture areas. Colonies of up to 150 individuals were translocated into areas where burrows had been previously created to house the sousliks. The translocation of the sousliks was carried out in April, before the main egg-laying period. To establish a self-sustaining colony of sousliks, re-introduction efforts often had to be carried out 3 or 4 times.

Great attention was paid to the known remaining breeding pairs. Nests were observed throughout the entire nesting period. Initially the adult falcons were observed in the nesting territory throughout February and March. During the first half of June the young falcons left the nest. The youngsters remained in the nest locality for approximately 2 months. During this time, protection of the nesting locality was essential to reduce any unwanted disturbance by farmers or inquisitive tourists. The most dangerous time for young falcons was the time of fledging. Inexperienced new flyers often fell into high wheat fields or maize fields under nest sites. Without human intervention and rescue, this unfortunate landing was often fatal for the fledglings. Young falcons at that time are easy prey for Goshawks, Ravens, foxes, feral cats and Eagle Owls. One nest record showed all four young falcons were killed by a single female Goshawk. Fortunately, nesting boxes reduced the natural predation losses that could be expected from naturally exposed nests. Furthermore, the nest boxes provided shelter from wind and rain and, therefore, further reduced mortality during incubation and post-hatching. The result of this intensive program was that the total number of active nesting pairs increased from an estimated 20-30 pairs to about 150 pairs during a 10 year period.

A similar extensive program was conducted in the former Czechoslovakia. To supplement natural pairs that already existed, a Saker Falcon captive breeding program was initiated. Some of the civil and military airports use Sakers to protect runways against nuisance bird species. These falcons were taken from nests by special permits, and some of these falcons formed the nucleus of breeding programs of genetically related subspecies which were native to a given region. Reared chicks were used only for reintroduction into the wild. This was done by hacking in localities where no natural pairs were known to exist. Hacked falcons were expected to return to hack areas to establish nests and raise young of their own.

Another method of reintroduction was the adoption of captive-bred falcons into wild nests containing naturally bred Sakers. Using this method young falcons (usually 2 to 3) were carefully selected by age and placed into a wild nest containing a single remaining wild falcon. By this method there were records of very successful and "tolerant" parent falcons successfully rearing 9 young from one nest; 5 natural and 4 adopted.

The final result of this restoration program, which is still ongoing, was the stabilization of the Saker population, which continues to grow and spread into new territories with suitable environments. To this end I would like to encourage other enthusiasts to start similar programs wherever they are needed. I hope that our experiences can benefit others with a falcon restoration goal in mind.



The Buteo population of Socotra

Simon Aspinall,
ADIAS,
c/o P.O. Box 45553,
Abu Dhabi, UAE

The isolated endemic population of buzzard on the Yemeni island of Socotra in the Socotra archipelago, the so-called Socotra buzzard *Buteo sp.*, has an unclear systematic position. It has been variously linked, by differing authorities, to two other *Buteos*, one a subspecies, the other a full species. Respectively these are the steppe buzzard *B.b. vulpinus* which is found breeding at its closest point in northern Iran, over 2600 km distant, and the resident mountain buzzard *B. oreophilus* of Africa, which still appears no nearer than 1700 km distant at its nearest point, in Ethiopia (Martins & Porter 1996).

The migratory steppe buzzard, which leaves Asia and primarily follows a Red Sea route into Africa each autumn, has knowingly only been recorded once in Socotra (Porter pers. obs.). That the Socotra buzzard may have hived off from the steppe buzzard lacks any firm supporting evidence, moreover the bird itself is structurally closest in appearance to the Eurasian common buzzard *Buteo buteo* (Martins & Porter 1996 & pers. obs.). That it should be considered subspecific to mountain buzzard is probably on grounds of geographical proximity alone, an argument again without much foundation.

One recent plausible hypothesis was forwarded by Hazevoet (1995) who suggested that the analogous populations of the Cape Verde Buzzard on the Cape Verde islands, of the eastern Atlantic off the Africa coast, and of Socotra, albeit lying closer to the Somali coast off the Horn of Africa than to Yemen itself, represent relict derivatives of a now extinct African population of "proto-buzzard" that existed before or during the Pleistocene epoch. This proto-buzzard would also have, it is suggested, formed the stock for the Eurasian *Buteos*. If this is indeed the case, as Martins & Porter (1996) in discussing the literature on the systematic position of the Socotra buzzard state, then these two insular forms would have less in common with Eurasian *Buteo* taxa than had been previously thought, representing instead separate evolutionary lineages which "proceeded independently" in their respective oceanic situations.

Martins & Porter (1996) conclude that under the 'phylo-

genetic species concept' and by virtue of individuals being consistently diagnosable from related forms according to morphological or other characters, this taxon constitutes a 'basal evolutionary unit' and should thus be treated as a full species in its own right, something to which the current author would subscribe. This treatment has, it should be noted, already been afforded to the Cape Verde Buzzard population as *Buteo bannermanni* (Hazevoet 1995), something which has now, it is believed, been endorsed by recent DNA analysis (Clouet pers. comm.). Publication of the results of DNA analysis of the blood samples already collected from Socotra's *Buteo* (by both Clouet & BirdLife International) are, none too surprisingly, eagerly awaited.



Socotra Buzzard

The Socotra buzzard breeds during the winter months i.e. outside the monsoon season when hunting may be hampered by rains, low cloud and buffeting winds (and this would merely serve to isolate the taxon further still). Survey and atlassing work by teams from BirdLife International, involving Yemeni (including Socotran) counterparts, suggests the Socotra buzzard to be not uncommon, particularly through the limestone plateau area and around the flanks of the rugged granitic Haghier. Population estimates remain somewhat preliminary at this stage, but with certainly less than 500 pairs, it is, along with the Socotra bunting *Emberiza socotrana*, one of the island's two rarest breeding endemics.

Interestingly, from an ecological viewpoint, is the fact that the lack of a small terrestrial mammal population, including rodents (other than rats in towns) on the island,

would necessitate a rather atypical staple diet for a *Buteo*. Although invertebrates and reptiles form a variable but generally modest percentage of the diet of Eurasian *Buteos*, at least for much of the year, for example, on Socotra there is no alternative for them but to form the bulk of the diet throughout the year. There is, furthermore, no evidence to suggest that the Socotra buzzard preys on birds to any extent, although, and even if, nestlings may feature for part of the year, for the greater part of the year they would be unavailable and it would seemingly have to be geckoes, skinks, lizards, snakes and beetles which are consumed. Chameleons possibly appear on the menu too, while hitherto unconsidered arthropod groups, mantids, orthoptera (grasshoppers, crickets etc) and hymenoptera (bees, wasps etc) among them, may yet be found to be of some import. An altogether very interesting ecological study might be made here.

For the Socotra buzzard, a perched lookout (sit and wait) method of hunting is apparently commonly employed, something not lending itself especially to capture of birds (nestlings excepted perhaps), and particularly when rapid aerobic pursuit or surprise is not an option open to this species. Such foraging is, however, typical of other raptorial species preying on diurnal reptiles and invertebrates, as with the numerous kestrels *Falco tinnunculus* and southern grey shrikes *Lanius meridionalis* also found on the archipelago.

The Socotra buzzard is not considered particularly threatened, although nestlings are occasionally removed from their nest and kept captive, as was witnessed in the island capital, Hadibu in November 1999. (Most probably die from improper care). Such removal of birds from the population is not something that can be disregarded and its practice must be discouraged, perhaps being achieved best through an education programme. Although there is otherwise apparently no persecution, the precautionary principle must apply in what, with such a small population, is clearly a vulnerable position.

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Post-mortem shrinkage in large falcons

Christopher P. Eastham

Mill Hill Cottage,
Auchterarder, Perthshire, PH3 1PQ, UK
e-mail: mill.hill@virgin.net, shunqar@hotmail.com

Mike K. Nicholls

The Ecology Research Group, Canterbury Christ
Church University College, Canterbury, Kent, CT1
1QU, UK
e-mail: m.k.nicholls@cant.ac.uk

Nick.C. Fox

The Falcon Facility, Penllyn Farm, College Road,
Carmarthen, Carmarthenshire, SA33 5EH, UK
e-mail: office@falcons.co.uk

Occasionally, in order to increase sample sizes in taxonomic studies, it is necessary to combine measurements from live or fresh specimens and dry study skins. Before pooling measurements, however, the amount of post-mortem shrinkage must be accounted for. The shrinkage in wing and tail length has been calculated in a number of bird species (table 1). Greenwood (1979) found no significant shrinkage in tarsus and bill length of dunlins (*Calidris alpina*), while Summers (1976) calculated bill shrinkage in the turnstone (*Arenaria interpres*) to be 5.4% in males and 4.4% in females, and in the sanderling (*Calidris alba*) 1.6% in males and 2.7% in females. However, as Greenwood (1979) pointed out, Summers (1976) did not compare fresh and dry measurements from the same specimens, but rather measured a series of freshly collected birds and compared them with skins from local museums in South Africa. What is needed is information on measurements where individual specimens are measured when live, freshly dead and after preparation as museum skins.

As such we report here estimates of the shrinkage of morphometric characters of fresh and dried skins of large falcons, so that measurements from sakers (*Falco cherrug*) in both states could be combined for taxonomic studies.

Methods and materials

To assess shrinkage four casualty falcons, which had died at the Falcon Facility, National Avian Research Center, Wales, UK, were assessed. These included a male and female saker, and two male gyr (*F. rusticolus*) / saker hybrids. Wing width, wing, tail, tarsus and digit three lengths were measured ten times on each specimen when fresh; then again ten times after three months drying, and finally a further ten times on eighteen month old dry skins. Paired t-tests (Fowler and Cohen 1997) were used to compare measurements of characters. Morphometric characters were measured by one author (CPE) using digital calipers, steel rulers and tape measures in accordance with Fox, Eastham and Macdonald (1997).

Results and discussion

All four falcons showed a significant difference ($P < 0.01$, with 9 df) between live and dry (18 months old) study skins for measurements of wing length (P9), wing width (WW), and tail length (R1) (table 2). Wing length had a mean shrinkage of 0.83%, wing width 1.68%, and tail length 0.96%. At three months old the specimens had already started to dry and shrink.

There was no significant ($P < 0.01$, with 9 df) shrinkage for the tarsus length and digit 3 length. On two occasions digit 3 length increased slightly. This increase, however, was not significant and probably due to measurer error.

Results showed a small amount of shrinkage in dry falcon

study skins. Shrinkage of wing length is probably associated with loss of synovial fluid at the carpal flexure of the wing as the specimen dries (Fox 1977). Shrinkage of tail length is attributed to the skin at the base of the quill offering little resistance to calipers in fresh specimens, until they had depressed the flesh. The dry skin of museum specimens on the other hand offer immediate resistance, and therefore results in shorter measurements being recorded (Greenwood 1979).

When combining measurements from live falcons and dry study skins shrinkage must be accounted for. It is suggested that measurements from primary, secondary and tail feathers of saker and other large falcon study skins should be increased by a correction factor of 1.16% (the mean percentage shrinkage found in this study) when combining with measurements from live specimens. No shrinkage was observed in measurements taken from skeletal parts, e.g. tarsus length and so no comparable corrections seem to be needed.

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Table 1. Post-mortem shrinkage of wing and tail length in various bird species.

Common name	Scientific name	Author and year	% shrinkage of wing length	% shrinkage of tail length
New Zealand falcon	<i>Falco novaeseelandiae</i>	Fox 1977	0.3-0.4	
Rooks	<i>Corvus frugilegus</i>	Knox 1980	1.24	
Willow ptarmigan	<i>Lagopus lagopus alascensis</i>	West, Savage, Irving & Peyton 1968	0.39	0.69
Ringed plover	<i>Charadrius hiaticula</i>	Green & Williams 1972	2.7	
Ringed plover	<i>Charadrius hiaticula</i>	Taylor (in Greenwood) 1979	1.8	
Lapwing	<i>Vanellus vanellus</i>	Vepsalainen 1968	2.0	
Dunlin	<i>Calidris alpina</i>	Greenwood 1979	1.0	2.4
Lesser black-backed gull	<i>Larus fuscus</i>	Barth 1967	1.24	
Herring gull	<i>Larus argentatus</i>	Barth 1967	1.2	

Table 2. Comparison of measurements between live falcons (n=4) and dry study skins. Characters were compared using a paired *t*-test with nine degrees of freedom. Each character was measured ten times on fresh, three months and eighteen months old specimens. Level of significance ***P* < 0.01.

Species, sex and falcon identification	Character	Mean of fresh (mm)	Mean of 3 month old skins (mm)	Mean of dry skins after 18 months (mm)	Total shrinkage (%)
Saker, female, UK81280	Wing length	399.8	398.3	396.6	0.80*
	Wing width	225.0	224.1	223.2	0.80*
	Tail length	225.0	224.0	223.2	0.80*
	Tarsus length	57.9	57.8	57.9	0
	Digit 3 length	52.4	52.4	52.5	-0.19
Saker, male, 000007 UAE	Wing length	374.8	374.0	372.2	0.69*
	Wing width	225.0	224.5	222.0	1.33*
	Tail length	208.2	207.3	206.2	0.96*
	Tarsus length	56.2	56.0	56.1	0.18
	Digit 3 length	46.6	46.5	46.5	0.21
Gyr / Saker, male, 12074W	Wing length	374.8	373.4	372.2	0.69*
	Wing width	214.4	213.1	210.6	1.77*
	Tail length	207.6	207.0	206.2	0.67*
	Tarsus length	59.7	59.4	59.6	0.16
	Digit 3 length	50.3	50.2	50.3	0
Gyr / Saker, male, 14829W	Wing length	371.8	371.0	370.6	0.32*
	Wing width	213.8	212.0	211.0	1.31*
	Tail length	207.6	207.1	206.2	0.67*
	Tarsus length	58.7	58.8	58.6	0.17
	Digit 3 length	48.5	48.5	48.6	-0.21

Pesticide contamination of a free-living houbara bustard captured by a falconry party in Pakistan

Tom Bailey, Walter Pearson and Abdullah Siddiqui
ERWDA
PO Box 45553
Abu Dhabi, UAE

In February 2000 we examined a free-living houbara bustard carcass that was submitted for post-mortem examination at Abu Dhabi Falcon Hospital. The bird was caught by a falconry party in Pakistan and two falcons that fed on the carcass became 'very sick' and were reported to have regurgitated, unfortunately no further details were available. A thorough examination of the fresh (<24 hrs) houbara remains was conducted. To cut a long story short, virus isolation, histopathology, bacteriology and fungal culture were performed with no significant findings. Samples of tissue were submitted for pesticide analysis at the Environmental Research and Wildlife Development Agency (ERWDA) and the kidney sample showed Quintozene (Pentachloronitrobenzene) at 0.44 mg/kg.

Quintozene is a fungicide applied to seeds and field crops and it is considered relatively non-toxic for gamebirds, the LD50 in bobwhite quail is 170 mg/kg (EXTOXNET). Although there appears to be no data concerning this com-



Houbara in its natural habitat

pounds toxicity to raptors, levels of hepatic microsomal enzymes (involved in toxin metabolism) in raptors are much lower compared with omnivorous species such as game-birds (Walker and Ronis, 1989), including houbara bustards (Bailey *et al*, 1998). These low microsomal enzyme levels make raptors far more susceptible to environmental pollutants such as organochlorines (Walker *et al*, 1987). There were probably other possibilities for the ill health of the falcons described in this report, clearly illustrated by the article on ammonium chloride toxicity in this Falco, but this finding raises interesting questions regarding pesticide contamination of the most important prey resource for traditional Arabian falconry.

We are interested to know more about the health of free-living houbara bustard populations. We would like to collaborate with veterinary colleagues attending hunting parties who might be able to collect houbara tissues for pesticide analysis and other health investigations that we are con-

ducting at ERWDA. Please contact Tom Bailey at the Abu Dhabi Falcon Hospital if you are able to help.

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Report on the International Seminar on the Indian Vulture Situation September 2000

Jemima Parry-Jones M.B.E.
Director, The National Birds of Prey Centre
www.nbpc.co.uk

On September 18th, 2000 a workshop held at WWF Delhi for invited guests was called by the Bombay Natural History Society, in conjunction with the RSPB, BirdLife International and the Indian Department of Natural Resources to discuss the increasing fears that something drastic was happening to the Indian White-backed Vulture (*Gyps bengalensis*) and the two species of Long-billed Vulture (*Gyps indicus* and *Gyps tenuirostris*). Responses to a questionnaire sent out by BNHS resulted in 90% of the respondents saying that the vultures had declined over the last ten years. Over 60% felt that the vultures had declined drastically and 28% said that the vultures had gone from their areas completely. All the *Gyps* species have large ranges which overlap and so if the reason for the decline is an Infectious Disease Agent, then the potential for this IDA to affect other species of *Gyps* and move across their ranges through Asia, Europe and Africa should not be dismissed.

The initial paper was given by Dr Vihbu Prakash from BNHS who was the principle investigator in a recent survey on the populations of White-backed and Long-billed Vultures. This was instigated because of the population

crash that was becoming very apparent in these two species of vultures. The surveys were made in 17 protected areas, areas adjoining the protected areas, known carcass dumps, and highway surveys covering 7236 km. The road transects that were made followed as much as possible the previous highway raptor surveys done in 1990 - 1993, and where possible at the same time of day.

All vulture species were surveyed, although the emphasis was on griffon (*Gyps*) vultures. At the same time habitat changes and availability were noted and the numbers of



Vulture die-off in India

available carcasses were counted. In one area over 100 carcasses were counted with vultures being present at only three of them. The results of the survey pointed to a 90% population drop in both the Indian White-backed Vulture and the Long-billed Vultures in all the areas surveyed. In some areas the birds were not seen to be present at all. The numbers of juvenile birds seen was also very low. The normal ratio of adults to juveniles is 2:1. In the White-backed

Vulture survey the ratio was 9 adult birds to 1 juvenile. Normally White-backed Vultures have a high success rate in breeding, this low density of juvenile birds points to significant nesting failure. Because of the timing of the survey the adult:juvenile ratio was not calculated on Long-billed Vultures as most of the nestlings had not fledged. The 'neck drooping syndrome' which was observed in birds at

Keoladeo National Park and appears to precede the birds dying, was seen in both species of vultures in all areas of the survey where vultures were located.

Dr Risebrough from USFWS talked about the findings from samples given to him by BNHS and others so he could look for potential poisoning and pesticides as the possible cause for the decline. The upshot of his talk was that although there were traces of various potential toxins, none were at lethal doses, or could explain the dramatic decline in the vulture populations. However further investigations needed to be carried out to rule out other toxins. Nor was there any evidence given to support suggestions that drowning in cattle troughs or electrocution (both important factors in small vultures populations in S Africa and Israel) or shooting, or lack of food might be having an effect on the Indian vulture populations.

Nine fresh vulture carcasses were examined by Dr Andrew Cunningham, pathologist at the Zoological Society of London. All nine vultures had died of an IDA, possibly a virus. He stated that much work still needed to be done and more fresh carcasses needed to be examined. Sadly the Indian government will not allow any samples to be sent to laboratories outside India at this point. However the Poultry Laboratory at Puna, who had done some of the initial work, since the conference, have made more resources available towards identifying the cause of death in the vultures.

After the first morning, the workshop divided into three groups, the first of park managers and vulture biologists, the second of vets and toxicologists and the third of people with experience in captive populations. Their task was to look at the problems facing the *Gyps* vultures and to recommend measures to conserve the species. Almost all agreed that disease seems to be the primary cause for this extreme population crash in such a very short period of time. This fact was then highlighted by Munir Virani from The Peregrine Fund who reported that he had just carried out a survey of *Gyps* vultures through Pakistan and Nepal and driven over 2000 kilometres. He showed slides of vultures from both countries showing the same head drooping syndrome. The nearer to the Indian border he went in Pakistan, the higher the proportion of birds showing this behaviour. He also spoke to local people who reported that vultures were dying in unusual numbers over the last few years.

The conference concluded with a visit to a colony of 5000 Long-billed Vultures. We arrived early morning and walked the base of the cliff. We saw about 50 vultures and the population is said to now be approximately 200. At the base of the cliff we found 15 dead vultures in varying stages of decay and saw more that had fallen and got stuck in crevasses on the cliff. On speaking to the villagers at the base of the cliff, they said that the numbers used to be millions (an exaggeration!) but now there were very few left. They reported sick, dying and dead vultures being found in their fields that ran along the base of the cliffs. Having spoken to a number of people after the conference

I think that the description of the sick vultures is actually misleading, and a number of people have said that they have seen this behaviour in healthy African vultures during the heat of the day. However when shown pictures of the sick birds, they have then stated that this is in fact not the behaviour they have seen. The Indian vultures exhibit this behaviour for what appears to be abnormally long periods, and although it was thought that a similar behaviour had been seen in African vultures, it was a rare occurrence. 17% of the White-backed Vultures and 11% of the Long-billed Vultures were recorded with this behaviour.

In fact it is not the neck that droops, these birds hang their heads almost down to the ground level. We saw four or five birds in Delhi doing this perched in some trees near a hotel. We were close enough to see well with binoculars, their heads were hanging, their eyes were semi-closed and their body feathers were slightly fluffed up away from their bodies, they looked very sick. It was fairly close to dark and the temperature was not hot. We were told by the locals that one bird had fallen to the ground several days before and had subsequently died.

The Peregrine Fund, Ornithological Society of Pakistan and Bird Conservation Nepal, are starting work on further surveys and collecting samples, which will be distributed to various laboratories, including some outside the countries of origin. They are also initiating a captive breeding programme if healthy birds can be secured. RSPB and BirdLife International, along with ZSL, NBPC and other groups are putting together proposals for funding to the Darwin Initiative for a project to take and hold captive birds for research and monitoring within India, and a possible captive breeding programme if healthy birds can be established and if the need arises.

The Parsi community in Bombay, working with NBPC is also looking at a project to take and keep up to 200 vultures, with the principal reason of being able to continue to follow their religious beliefs where vultures consume their dead. However, at the same time, the population will be monitored, and research and captive breeding will all be a part of their programme. The international participants felt that CITES ought to move the Indian White-backed Vulture and the Long-billed Vultures to Appendix 1 and that movement in trade of the other *Gyps* species should be suspended at this time except for special reasons, until more is known of the problem.



Ammonium chloride toxicosis: a major cause of mortality in captive saker falcons during a hunting expedition to Pakistan

Jesus L. Naldo DVM and Jaime H. Samour MVZ, PhD
Fahad bin Sultan Falcon Center
P.O. Box 55, Riyadh 11322
Kingdom of Saudi Arabia

Ammonium chloride, best known as “Schnather” in the Middle East, is an inorganic salt, commercially available as hygroscopic colourless crystals or as a white crystalline powder with a cool saline taste. Ammonium chloride is routinely administered by a considerable number of falconers in the Gulf to the falcons under their charge, with the aim of improving their hunting ability. Other falconers will administer ammonium chloride to a particular bird, which failed to kill or did not show interest in its prey during the first hunting trip. The procedure normally requires two handlers, one for casting the falcon and the second for forcing a small (10 to 25 mm diameter) crystal of ammonium chloride down into the crop of the immobilised bird. Another method is to wrap several small crystals of ammonium chloride in a piece of cotton cloth, forming a small sac and tied at one end with a piece of thin string about 25 cm long. When the small sac is force fed, the other end of the string is left protruding from the mouth so it can be used to retrieve the sac after several minutes. The theory behind this procedure is that the chemical action of ammonium chloride will remove ‘the fat deposits within the stomach’, resulting in a hungrier bird, which is, therefore, more interested in hunting.

Several minutes after the administration of ammonium chloride, the falcon usually vomits violently bringing up large quantities of thick green-yellow mucus, sometimes with whitish strands and the partially dissolved crystals. Falconers are very familiar with the toxic effects of this substance and they know that if the falcon is not able to vomit the crystal within five to ten minutes, the bird will certainly die. Sometimes, a large ingested crystal breaks down into smaller fragments within the crop, which results only in partial vomition of the crystal originally swallowed. In this case, the falcon soon becomes anorexic and lethargic, loses weight rapidly and begins passing dark metallic green faeces. During the terminal phase, the bird is unable to stand on its perch, remaining on the floor most of the time and the breathing becomes dyspnoeic. This is followed by fits and spasms lasting from four to eight hours, followed by death.

During a six-week hunting trip to Baluchistan, Pakistan, a total of 40 falcons were presented to the field hospital, some on several occasions for various medical reasons. Eleven birds were presented with toxicity-related clinical signs, 7 with trichomoniasis lesions, 9 with pseudomoniasis, 7 with sour crop, 1 with avian pox, 3 with traumatic injuries and 21 with clinical signs characteristic of birds in low condition. From a total of 40 birds presented for



Adult female Saker

examination, 15 were diagnosed with more than one medical condition.

Of the total eleven falcons presented to the field hospital displaying toxicity-related clinical signs, five died within twenty-four hours, three died after 2-3 days, while three birds recovered. Gross pathological post-mortem findings included weight loss, emaciation, dehydration, congestion of the mucosa of the digestive tract, presence of dark metallic green mucus and haemorrhages along the entire digestive tract. The liver was friable and dark metallic green colour. The kidneys and lungs showed mild to severe congestion. The diagnosis of ammonium chloride toxicosis was substantiated by the admission of the falconers that they gave the substance, sometimes over a period of several days to falcons that did not perform well during the previous day's hunt. They claim that falcons given ammonium chloride look more alert during hunting and are hungry all the time. However, in many cases, birds that were already stressed, hungry, emaciated, dehydrated and cold developed toxicity-related clinical signs within several hours or days following administration of ammonium chloride. Moreover, the falconers administered ammonium chloride crystals to the birds followed with a large quantity of water. This dissolved the crystals more quickly resulting in a larger amount of toxic substance absorbed by the gastrointestinal tract.

Medical management of ammonium chloride toxicity-related cases consisted of the chelating agent Ca Na₂ EDTA administered undiluted intramuscularly at the dose

rate of 200mg/kg BID for three days. Additional treatment included piperacillin at the dose rate of 100 mg/kg IM BID for five days, corticosteroids 3mg/kg IM SID for two days, lactulose 0.5 ml/kg BID, vitamin B1 0.5 ml/kg IM once a week, vitamin B12 0.5 ml/kg IM once a week. Subcutaneous/oral fluids and tube feeding were given until the bird could eat voluntarily. Response to medication usually depends on the amount of toxic substance ingested and the length of time between the onset of the initial signs of toxicity and the initiation of therapy. Three falcons with mild toxicity-related clinical signs, which were brought into the hospital soon after the falconers noticed the clinical signs, responded well to the medical management mentioned above.

Of the total 16 falcons that died during the hunting trip, ammonium chloride toxicosis accounted for 50% of all deaths. Other causes of mortality were aspergillosis (1), pseudomoniasis (1) and low condition (6).

Stress-related diseases, which include aspergillosis, air sacculitis, avian pox and low condition, are commonly encountered in hunting falcons. Stress factors such as environmental, nutritional, physical and psychological weaken the immune system, leading to the development of disease. Although most of the stress-related diseases encountered during the recent hunting trip, with the exception of aspergillosis, are treatable with supportive measures, treatment was not always successful. One reason was the lack of dedication on the part of the falconers and lack of proper concern for the needs and health of their falcons. They pushed their falcons to the limit and only sought medical

help when the bird reached the terminal stage of a disease. Another reason was the unfavourable environmental conditions in the hunting grounds of Pakistan. Aside from the cold weather, the hunting party regularly moved from one camp to another camp every few days, sometimes every-day for five days. This travelling caused added stress to the already sick birds. Moreover, medications and proper feeding could not be given regularly according to schedule.

Although some falconers in the Gulf, particularly in the Kingdom of Saudi Arabia are now giving 'rangle' or small stones as alternative to ammonium chloride crystals, still the large majority of falconers are giving ammonium chloride to hunting falcons. However valid is their claim that ammonium chloride removes 'the fat deposits within the stomach', in order to have a hungrier bird, which is more interested in hunting, the fact remains that ammonium chloride is a highly toxic substance and can cause high mortality in hunting falcons.

While it may take several years, falconers in the Gulf need to be educated on the application of preventive medicine programmes and good husbandry practices to ensure health in hunting falcons.

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Aerosol use of a novel disinfectant as part of an integrated approach to preventing and treating aspergillosis in falcons in the UAE

Dr Dirk Verwoerd
Sheikh Butti Al Maktoum Wildlife Centre
Dubai

Members of the family *Aspergillus* fungi have been associated with a wide range of disease syndromes in man and animals. Most prominent in this regard have been the species *A. fumigatus*, *A. flavus*, *A. clavatus*, *A. niger* and their associated mycotoxins. The hepatotoxic aflatoxins B1, B2, G1, G2 and the immunosuppressant Gliotoxins seem to play the biggest roles in their pathogenicity, amongst a range of dozens of fungal metabolites that exert physiological effects in animals, either alone or in synergistic association with each other, from this genus. The aflatoxins in particular are of major concern as human hepatocarcinogens. Extensive research has been conducted in lab and farm animals during the past 30-40 years after contaminated Brazilian groundnutmeal caused the death of hundreds of thousands of turkey poults ("Turkey X disease") and subsequent investigations revealed the association with aflatoxins. These

fungi and their spores are ubiquitous, but strains differ widely in their ability to produce toxins, also the range of toxins produced by a particular strain under specific growth conditions (in vivo vs in vitro!) varies. Several biological, chemical and environmental factors ultimately determine the amount and combination of mycotoxins produced by toxigenic strains on a given substrate. Hot, humid micro-aerophilic conditions in association with organic material seems particularly favourable for explosive fungal growth along with the associated amounts of heterocyclic metabolites (mycotoxins) that are formed.

Furthermore, there are clear differences in the relative sensitivity of different animals to the effects of these mycotoxins, with extremely sensitive species e.g. trout hatchlings and ducklings even used as biological assays! Turkeys and ducks are the most sensitive commercial avians to mycoses and mycotoxicoses, while avian species from colder climates (penguins, Arctic waterfowl and gyrfalcons) rapidly succumb to aspergillosis under any stressful conditions, mainly as a fungal airsacculitis that

progresses to a fatal, multisystemic disseminated mycosis associated with irreversible toxic damage to the parenchymatous organs. The infection may vary from chronic and insidious to acute death. The immunosuppressive effects of some of the mycotoxins predispose these birds to opportunistic bacterial infections e.g. *Pseudomonas aeruginosa*. Most veterinary attention has focused on these avian groups, but accurate, early detection of infection as well as prognostic assessment of “successfully treated” patients remain challenges to all clinicians faced with these cases. Laparoscopic examination of the trachea and caudal airsacs, improved radiological detail of soft tissues and the use of antibody detection by ELISA are all being used successfully, but many early cases still escape detection. Further refinement of the currently available ELISA systems developed by Professor Pat Redig and colleagues in the USA, both in terms of antigen and conjugate specificity and the development of rapid, accurate toxin-based assays are logical next steps. The development of an effective vaccine remains elusive, in spite of major efforts in this direction by Poultry Research Organisations. However, new molecular techniques might be successful where conventional approaches have failed previously.

Pilot investigations by Professor Ullie Wernery from the Central Veterinary Research Laboratory, Dubai, in association with co-workers in Munich, Germany, on fungal isolates and affected organs obtained during necropsy on falcons here in the UAE have revealed high levels of certain mycotoxins and immunosuppressive gliotoxins. Further investigations exploring the importance, patterns of occurrence and counter-strategies against isolates from falcons are urgently needed to more effectively combat this very common condition. Falcon veterinarians can assist by collecting as much sera as possible from suspected, confirmed and convalescent aspergillosis cases for use in the validation of new tests/vaccines/treatment regimes.

Treatment of falcons with aspergillosis:

Early cases that are detected during routine examination procedures, many not showing any clinical signs except some green discoloration of the mites, usually carry a fair prognosis. In the falcon hospitals in the UAE they are generally treated for 21-30 days with 10-20mg/kg itraconazole (Sporonox, Janssen-Cilag Ltd, Buckinghamshire, UK) O.D., with food. During the 1999-2000 season several clinicians also experimented with an aerosol therapy in conjunction with this systemic treatment, with extremely encouraging results.

The particular design of the avian respiratory system that includes large spaces (airsacs) where air becomes humidified at body temperatures approaching 40°C and an absence of a rapid immune response due to the avascular nature of these structures, allows the establishment of fungal growth when the bird is exposed to high spore concentrations in the inhaled air. This also occurs in highly stressed/sensitive individuals when only low numbers of spores are inhaled. These fungal infections are often complicated with concurrent opportunistic bacterial infections. The delivery of antibiotics or antifungal drugs by aerosol

to such affected patients has been tried many times, usually with disappointing results. This has been related to the extremely irritating nature of most antifungal agents, causing severe erosive lesions on the sensitive mucosal surfaces of the respiratory system, thus defeating the objective. Alternative explanations of such therapeutic failures usually focus on the physical nature of microdroplets needed to penetrate to the furthest recesses and diverticulae of the airsac system. Recommended optimal sizes usually vary between 5-10 microns, necessitating the use of “nebulising” systems. There are however many other variables that determine the integrity and size distribution of microdroplets in any fog, thus affecting their relative penetrating ability into the avian airsacs. Some of these include;

- Relative humidity of the inhaled air
- Surface tension/chemical makeup of the droplets
- Nozzle size, velocity of the air/compound pushed through the instrument
- Still air vs air movement

The practical realities of treatments in clinics, hospitals and farming environments dictate a pragmatic approach.

We have used commercial “Foggers” suitable for the disinfection of rooms, incubators hospital wards, etc, that produce a wide range of microdroplet sizes and rapidly create a “standing fog” under any environmental conditions. This system of aerosol delivery using very low concentrations of a novel disinfectant compound has also been used to treat, as well as prevent, a wide range of respiratory conditions in many species. These include respiratory conditions in poultry (including prevention of Newcastle Disease Virus transmission during outbreaks) and exotic birds (including falcons), pneumonia syndromes in pigs, “Kennel Cough Syndrome” in dogs (and contaminated hospital wards), “Snuffles Syndrome” in cats (and contaminated catteries/hospital wards). Also treated include a wide range of other medical applications e.g. contaminated wound irrigation, refractive fungal dermatoses, etc.

This compound, named F10, was formulated in the UK for disinfection within pharmaceutical manufacture plants, particularly aseptic fill areas (intravenous drips etc). Manufacture started in South Africa in 1994 and since then F10 has been tested against every significant/index animal/human pathogen. It is used in animal production and food manufacture as well as pharmaceutical manufacturing. It is a complete spectrum virucidal, bactericidal, fungicidal and sporicidal, but aldehyde free compound of six main synergistic active ingredients. The ingredients are comprised of a new Quaternary Ammonium Compound (QAC) plus a new Biguanidine Complex; it is classified by Registration Authorities as such, but the exact formula remains for obvious reasons a commercial secret. It drew veterinary attention as it not only outperformed other disinfectants available during efficacy testing, over a range of temperatures and in the presence of moderate organic material, but it did so at

extremely low concentrations, short contact times, without any corrosive effects on infrastructure, metal alloy nozzles or any tissue irritation on workers and animals. Due to this combination of characteristics, it suddenly became feasible to regularly disinfect animal environments in their presence as a standard practice, lowering the environmental pathogen challenge significantly, with absolutely no negative side-effects. Many veterinarians in South Africa and neighbouring countries have now used this approach with extremely positive results. F10 is registered in South Africa (Reg No. G2781), New Zealand (MAF Reg No.H1280) and also passed all registration requirements in the UK (MAFF Reg No. outstanding, awaiting the completion of the administrative process).

I have used it in innumerable clinical situations in several countries (African and Arabian) since 1994 and was particularly encouraged with results obtained with “fogging” (not to be confused with “fumigation”, the dangerous and outdated practice of using formalin plus potassium permanganate to produce formaldehyde gas) of poultry, ostriches and exotic birds suffering from complicated bacterial and fungal respiratory infections.



Gyr/Saker hybrid

Individual patients have been treated in home-made Perspex boxes fitted with human nebulisers for 20-30 minutes at a time, 2-3 times a day, with a solution containing 0.2 % F10 Superconcentrate. Larger numbers of birds, especially if hooded or otherwise kept in the dark, have been treated by this “cold fogging” (in contrast to hot/steam fogging as commonly used in the disinfection of abattoirs) with commercial portable Foggers in designated rooms. Air-conditioners are switched off for the 30-40 minutes needed to empty the 5 litre container of the model that we use, once or twice a day.

Gyrfalcons undergoing predictable stress periods (initial manning/training, returning from initial training in the desert) have undergone this treatment during the 1999/2000 season in our facilities in Dubai, with no side-effects, and none of the usual previous pattern of falcons sick or dying from aspergillosis. Early diagnosed cases have made remarkably quick recoveries with this treatment regime, but advanced cases, especially those from Russia, seemed to be beyond any recovery. Unlike

experiences during previous years with aspergillosis in gyrfalcons, very few individual falcons were lost to this disease and we have started an integrated preventative programme as the next step.

Preventative medicine is in essence Managing Risk. Critical, predictable events or situations are identified and the associated health risks lowered as much as possible. In abattoirs, food processing plants this approach is known as “Hazard Analysis Critical Control Point (HACCP)” and has become the norm in modern export graded facilities. “Integrated Pest Control” is a term commonly used in agricultural pest animal control, usually referring to rodents or insects. The destruction of nests and prevention of breeding/multiplication, prevention of access to food sources, as well as the direct destruction of animals/insects through targeted poisoning etc are also essential parts to such programs.

A similar paradigm is needed in the control of *Aspergillosis* by managing the environment to make it as “fungus-unfriendly” as possible. This can be achieved by regular fogging with F10 of all chambers with newly arrived birds, new fledglings even while these are growing feathers and producing huge volumes of feather and dry faecal dust (perfect for bacterial and fungal growth!), as well as the hunting birds during training. Moulting chambers in the old style, covered with palm leaves to provide shade, are veritable “fungal gardens” during the extremely hot and humid conditions during summer in the UAE, and wherever possible should be replaced using more modern, inorganic materials like shade cloth netting or even brick and/or sandwich-panel customised buildings. The air conditioned boxes, A/C filters and feeding ledges in such facilities are regularly sprayed (backpack/knapsack sprayers), washed and fogged with F10 during summer thus inhibiting unchecked fungal growth and significantly lowering numbers of viable fungal spores and other pathogens in the falcons environment.

Please Note: While I am happy to discuss practical issues and personal experiences regarding the use of F10 or any other medication/ treatment protocol with my veterinary colleagues all detailed enquiry’s regarding test results or commercial aspects should be communicated directly with the manufacturers:

Mr John Temperley
Health and Hygiene (Pty) Ltd
Box 347, Sunninghill 2157
South Africa
Tel: 00-27-11-472 4372
Fax: 00-27-11-472 4211
e-mail: formten@icon.co.za
web site: www.healthandhygiene.com

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Editors note:

Presentation on F-10 Held at Abu Dhabi Falcon

Hospital. On 21/11/00 John Temperly from Health and Hygiene, South Africa, the company producing F-10, visited Abu Dhabi Falcon Hospital and gave an interesting presentation to AAV, ERWDA and MEFRG members.

His talk was entitled 'Using F-10 means that the hygiene factor both in preventative health maintenance as well as intervention management in the event of a challenge can be dealt with dynamically - no more waiting around for de-stocking before action can be taken'. We will expand on some of the other uses of F-10 in falcon medicine in future editions of FALCO.

Michael Lierz asked Tom Bailey to be the Middle East co-ordinator for the Association of Avian Veterinarians (AAV) after his departure from Abu Dhabi. Shortly before he left, Michael organised a social meeting which was well attended by AAV members.



Falcon Herpesvirus in the UK

Neil A Forbes CBiol MIBiol Dip ECAMS FRCVS
RCVS & European Recognised Specialist Avian
Medicine and Surgery; Petra Zsivanovits MRCVS;
Richard Saunders BVSc MRCVS; Shona Higston
MRCVS

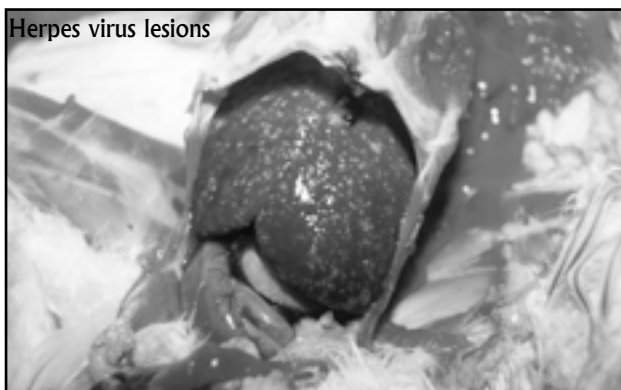
Avian and Exotic Animal Department
Clockhouse Veterinary Hospital
Wallbridge, Stroud, Glos. GL53JD. UK

Tel 44 1453 752555; Fax 44 1453756065
E mail birds@lansdown-vets.co.uk

Falcon herpes virus is only considered to occur occasionally in the UK, with three published cases in the last 18 years. In this practice despite a large raptor case load, no cases have been experienced until recently. During August and September 2000, two separate unrelated outbreaks were confirmed on histology and virus isolation, there are similarities between the two cases which we believe should be brought to colleagues attention. Herpes viral hepatitis has been reported in USA in owls (Green and Shillinger, 1935) and falcons (Mare and Graham, 1973), in Europe (Burtscher, 1965) and the UK (Greenwood and Cooper, 1982) and (Gough *et al.* 1993). The owl and falcon strains respectively, are antigenically similar and are both members of the avian Herpesviridae. Naturally occurring Falcon herpesvirus has been described in the Peregrine falcon (*Falco peregrinus*), European kestrel (*Falco tinnunculus*), Merlin (*Falco columbarius*), Red-necked Falcon (*Falco chicquera*), Prairie Falcon (*Falco mexicanus*), and American Kestrel (*Falco sparverius*) as well as experimental infection in Long-eared Owl (*Asio otus*), Screech Owl (*Otus asio*), Great Horned Owl (*Bubo virginianus*) (Mare and Graham, 1973) and a Barred Owl (*Strix varia*) (Morishita *et al.* 1994). Falcon, owl and eagle herpes viruses do not affect hawks (accipiters). The

gyr falcon (*Falco rusticolus*), is considered to be particularly susceptible (Remple, 1995). Herpesvirus isolates from falcons, pigeons and psittacines have been compared by restriction endonuclease analysis (Aini *et al.* 1993), finding that falcon and pigeon herpesvirus are similar but distinct from psittacine herpesvirus. Gough (1997) using the same test showed that some, but not all pigeon herpes isolates were similar to falcon herpes isolates. This finding supports the field observations that infection is thought to occur by ingestion of infected prey species (Graham, 1978), in particular pigeons (Redig, 1992, Aini *et al.* 1993, Morishita, 1994, Remple, 1995). In both of the recent cases investigated by this practice, pigeon had been fed some 5 days prior to clinical signs commencing. In the first case the keeper fed spent racing pigeons. The latter pigeons were frequently transported to and returned

from Europe. Lierz (2000) has shown that 35% of wild injured raptors tested in his survey in Germany were sero positive for falcon herpes virus. This is a surprising finding, indicating a high prevalence amongst free flying European birds. In view of this it is perhaps not surprising that pigeons flying from Europe might have been exposed to the virus and hence become carriers. In the second case the affected bird had caught



and eaten a feral pigeon in the SE England 5 days prior to the development of clinical signs. The catching and eating of feral pigeons by falcons has been recognised as a significant disease risk (in relation to falcon herpes virus) in the USA and Middle East for many years, but has not until now been considered a risk in the UK. The disease in falcons is usually peracute and rapidly fatal, with mortality approaching 100% (Graham, 1978). Clinical signs if seen are non-specific with lethargy, weakness, malaise, lime green staining of the urates and anorexia. A consistent haematological finding is leucopenia. In fatal cases the liver and spleen are grossly swollen, with small punctate lesions on the liver. Calvary inclusions are seen on his-

topathology.

Histological examination shows acute multi-focal coagulative necrosis in the liver and spleen. Small mainly eosinophilic intranuclear inclusion bodies can usually be observed in degenerate hepatocytes at the periphery of these necrotic lesions. Virus probably enters via the oral route and is subsequently excreted in body discharges. Some birds may become carriers and remain latently infected.

Herpesviruses are sensitive to acyclovir (Zovirax. Burroughs Wellcome) (80mg/kg tid po for 5 days) and Baypamun (1ml/kg i/m 3x in 48 hours). In the case described above affecting the gyr falcon, 5 in-contact falcons (peregrine, peregrine hybrids and merlin) were treated with acyclovir with the hoping of preventing further clinical disease. No clinical disease developed in the in-contact birds. The authors believe that these two cases indicate that the feeding of spent racing pigeons (especially those flying in central Europe) as well as the ingestion of feral pigeons by falcons in the UK may now present an unacceptable risk and should be discouraged.

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Letters to the Editor

JD Remple

**Dubai Falcon Hospital, P.O. Box 23919 Dubai
United Arab Emirates**

Falcon Herpesvirus Vaccine

There has been a general trend away from the use of modified live herpesvirus vaccines (MLV) in veterinary medicine. Although MLV herpesvirus vaccines produced a superior vaccine response compared to a killed vaccine (KV) they often stressed the vaccinates, caused illness in immunosuppressed animals, and occasionally (though rarely) reverted to virulence. These concerns involving the use of MLV herpesvirus vaccines in adapted, domestic animal hosts are magnified when considering their use in non-adapted wildlife hosts that we have no control over.

Viral shedding is a concern in an immunosuppressed host that is vaccinated with a MLV. All vaccinates that are successfully "infected" (vaccinated) with a MLV vaccine can

be made to shed vaccine virus under immunosuppressive conditions. Under normal conditions, vaccinates latently harbor the virus and do not shed. Although shed vaccine virus would pose no threat to other hosts of the same species, no one can be certain that the shed vaccine virus could not be an introduced pathogen for other wildlife species hosts. This is an important concern that has been addressed by several experts including Dr. David Graham and Professor Ian Tizard.

Although FHV is presumably fatal for all members of the genus, *Falco*, there are some species that are clearly more susceptible than others. The most susceptible falcon to FHV is the gyrfalcon, hence the considerable interest in developing a vaccine. A MLV that is modified sufficiently to be nonpathogenic for a kestrel may still be potentially fatal for a gyrfalcon. Furthermore, in a host as unadapted as a gyrfalcon, could the modified herpesvirus revert to virulence under stressful conditions more easily?

Before claims can be made regarding the safety and efficacy of a MLV herpesvirus vaccine, the design and scope of the vaccine experiment should be thoroughly examined.

- a. How many individuals was the vaccine tested on, and did this range of individuals include a statistically significant number of supersusceptible individuals (gyrfalcons)?
- b. How did these individuals react when subjected to immunosuppressive conditions?
- c. How did these individuals react when subjected to immunosuppressive drugs?
- d. How were they challenged and by what route?
- e. What was the challenge dose and was it realistic for natural challenge?
- f. Over what period of time were the vaccinates observed?
- g. How does the immune response hold up over time?

Even if the vaccine passes all the above tests, because of the potential dangers associated with the use of attenuated (MLV) herpesvirus vaccines (especially in wildlife species), it is extremely difficult to get United States of America government approval for their use, even under non-commercial field test guidelines. In North America this would be next to impossible and would take years. I assume the same conditions hold true for Europe.

A good immune response to herpesvirus necessitates a strong cell-mediated immune response (CMI). To achieve this, new and improved KVs incorporate special immunity boosters such as paraimmunity inducers and immune stimulating complexes (ISCOMS). These supercharged KVs often generate an overall immunity equal to a MLV but with the assurance of complete safety. Should we not be more judicious in the production and use of vaccines?

Editors note:

Readers who are interested in this topic should refer to the full papers referred to in the 'What's New in the Literature' section of the last FALCO issue (Wernery, U. *et al*, 1999, Journal of Veterinary Medicine, 112, 339-344 and Remple, J.D. Considerations on the production of a 'safe and efficacious' Falcon Herpes Vaccine, Raptor Biomedicine 3). It is worth clarifying that Wernery *et al* have acknowledged the need for further work before the results of herpes virus vaccination in kestrels can be extrapolated to other species. To quote from their paper, "However, it should be stressed that more vaccination trials on a greater number of falcons and other species should be carried out to substantiate these results, because it is known that different falcon species are variably susceptible to herpesvirus infections."

What I think that none of us working with raptors will disagree with is the real need to have a pool of falcons that are available for *bona fide* clinical research projects. We are fortunate to have access to well-equipped laboratories and

dedicated laboratory personnel who are interested in helping us develop new products to improve falcon health in the region. There is no doubt that clinicians are frustrated that many of the vaccines and therapeutic medicines that are used in falcon hospitals across the Gulf on a daily basis have not been thoroughly assessed. If we were working with companion or food animals would we be allowed, or even happy, to use vaccines that have not undergone rigorous clinical and field trials? Our patients are more valuable than companion and domestic animals and with the current interest in raptors in the Middle East a golden opportunity exists for the larger falcon hospitals to allocate resources and have falcons available for research. A number of clinicians who are MEFRG members, including Michael Lierz, Jaime Samour and Dirk Verwoerd, are to be congratulated on initiating important clinical research projects at their respective hospitals. Further comments on this topic are welcome from MEFRG members.



Raptor biology - A new course in Cambridgeshire, England.

**Professor John Cooper,
Wildlife Health Services,
PO Box 153, Wellingborough,
UK**

A one day course on raptors was organised recently by Lifelearn Ltd. This was one of a series of courses which provide an introduction to "exotic" animals and their veterinary care. A particular feature of the Lifelearn programme is the inclusion of a large practical element. The courses are generally held in institutions where live animals are available and where registrants can gain practical experience as well as attend theoretical lectures. The day proved very successful and this was in no small part due to the hospitality and welcome provided by the staff at the Raptor Foundation. The atmosphere was such that the veterinary surgeons and veterinary nurses who attended quickly became absorbed in the world of birds of prey - an ideal environment for learning the basics of their biology and medicine. Further courses of this kind are planned, and those dealing with birds of prey are likely to be hosted by the Raptor Foundation.

Information about the Foundation and its plans for training programmes, are available from The Foundation at The Heath, Woodhurst, Cambs, PE17 3BT, UK.

Information about Lifelearn and its various activities is available from Lifelearn Ltd, PO Box 16, Newmarket, Suffolk, CB8 7TH, UK.



What's new in the literature?

Below is a list of some recently published papers and a thesis, 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 once again acknowledge the help of the delightful Mrs Catherine Tsagarakis from NWRC, Taif for her continuing help conducting literature searches! If we have missed any, please send for the next issue.

Barton, N. W. H. (2000) Trapping estimates for Saker and Peregrine Falcons used for falconry in the United Arab Emirates. *Journal of Raptor Research*. 34(1):53-55.

Saker Falcons (*Falco cherrug*) and Peregrine Falcons (*Falco peregrinus*) are the most commonly used falcons in the Middle East. The veterinary clinic records from the Dubai Falcon Hospital provide a basis for estimating the number of falcons being trapped annually. During the period 1993-1998, Peregrine numbers have increased by 12.5%, Saker numbers have decreased by 43% and captive-bred Gyrfalcon (*Falco rusticolus*) hybrids have increased to 13.8% of the total falcons seen. Juvenile female Sakers have decreased by 54%. The paper considers reasons for these changes including trapping pressure, market changes and the influence of captive-bred falcons.

Lierz, M. (2000) Investigations of injured and debilitated birds of prey and owls from Berlin and Brandenburg. Thesis, Free University of Berlin, Germany.

84 free-ranging birds of prey and owls were examined at the Free University of Berlin over a one year period. This study involved a survey of diseases in the presented birds and tried to attach importance to the different types of examinations in relation to rehabilitation prognosis. The species distribution was as follows: Eurasian buzzards (*Buteo buteo*) (n=32/ 38.1%), kestrels (*Falco tinnunculus*) (n=20/ 23.8%), sparrowhawk (*Accipiter nisus*) (n=9/ 10.7%), goshawk (*Accipiter gentilis*) (n=8/ 9.5%), black kite (*Milvus migrans*) (n=4/ 4.8%), peregrine falcon (*Falco peregrinus*) (n=3/ 3.6%), marsh harrier (*Circus aeruginosa*) (n=1/ 1.2%), white-tailed sea eagle (*Haliaeetus albicilla*) (n=1/ 1.2%), tawny owl (*Strix aluco*) (n=4/ 4.8%), long-eared owl (*Asio otus*) (n=1/ 1.2%) and barn owl (*Tyto alba*) (n=1/ 1.2%). 45.2% of the patients were males, 54.8% females. 17.9% of the birds were eyasses, 38% juvenile and 44% adult. Most commonly the birds were presented because of trauma (63.1%). An infectious disease was detected in 59.5% of all presented raptors, while a non-infectious disease was found in 40.5%. During the ophthalmological examination, 7.5% of the patients showed alterations in one of their eyes. After radiology 31.2% of the birds were considered as normal. The other cases commonly showed fractures (46.8%) and enlargement of the liver (40.3%). Tracheal swabs were positive for bacteria or fungi in 62% of the samples taken. During endoscopy only 19.4% of all investigated birds

were without pathological abnormalities. Bacteriological and mycological analysis showed different species of bacteria and fungi present in 70.7% of the air sac and in 48% of the liver biopsies. Histopathological investigations showed alterations in 70.8% of the air sac biopsies. Liver biopsies showed 8.2% of the cases had histopathological alterations. Parasitology results showed 97.6% of the birds had feather mites and 25% had Hippoboscid flies. *Trichomonas sp.* were detected in 28.6% and blood parasites (*Leucocytozoon sp.* and *Häemoproteus sp.*) in 26.9% of the cases. Endoparasites were found in 58.3% of the birds. Nematodes (48.8%) showed a higher prevalence than trematodes (16.7%), cestodes (14.3%) and acanthocephalens (2.4%). Mycoplasmas were present in air sac biopsies and/ or tracheal swab of 47.1% of the birds. *Salmonella* was not detected in any of the fecal samples. *Chlamydia psittaci* was found in 16.7% of the birds. Serological investigations showed antibodies against falcon herpesvirus (strain M1869/92 from merlin) in 35.5% of the cases. Antibodies against paramyxovirus 1 (test strain F) were detected in only one bird. Abnormal blood values, compared to reference values, were shown in 88.2% of the birds.

Movalli, P.A. (2000) Heavy metal and other residues in feathers of lugger falcon (*Falco jugger*) from six districts of Pakistan. *Environmental Pollution*. 109 (2): 267-275.

The lugger falcon is resident or locally migrant throughout the Indian subcontinent where it is a rare and declining species. Breast feathers from 57 live, recently trapped, adult and juvenile lugger falcons and from five dead birds were collected from Bahawalpur, Bahawalnagar, Mithi, Chachcro, Jacobabad and Karachi districts. Cadmium (Cd), lead (Pb) and mercury (Hg) were analysed by atomic absorption spectrophotometry (AAS), cobalt (Co), selenium (Se), zinc (Zn), scandium (Sc), chromium (Cr), cesium (Cs), lanthanum (La) and bromine (Br) by neutron activation analysis (NAA). Hg levels were below those found in other raptors with reduced reproductive success. No correlation was found between Hg and Se levels. Concentrations did not differ significantly between males and females nor between juveniles and adults, but differed among districts for Pb, Hg, Co, Sc, Cr, La and Br. A significant correlation was found between Pb concentration and occurrence of louse eggs. As the lugger is resident or a partial local migrant, it is probable that the metal burden in adult and juvenile feathers reflects the level of contamination in these particular districts.

Nesje, M. et al. (2000) Genetic relationships in the peregrine falcon (*Falco peregrinus*) analysed by microsatellite DNA markers. *Molecular Ecology*. 9 (1) :53-60.

Microsatellite DNA markers were developed from a peregrine falcon (*Falco peregrinus*) and genetic relationships among peregrine falcons in southern Norway were analysed using the markers. The genomic DNA library was screened for the presence of dinucleotide microsatel-

lite repeats. Twelve loci revealed polymorphism through the initial analysis of 24 unrelated peregrine falcons, and Mendelian inheritance was confirmed in two peregrine falcon families bred in captivity. The estimated mean probability of identical genotypes in two unrelated individuals was 3×10^{-8} , and the combined exclusion probability for parentage testing was 0.99 and 0.94 for one or both parents unknown, respectively. The markers were used to investigate the parentage of peregrine broods from the same nest site from different breeding seasons, and subsequently the nest-site fidelity of the breeding peregrines. Cross-species amplifications showed that most loci also appeared to amplify polymorphic products in the gyrfalcon (*F. rusticolus*), merlin (*F. columbarius*), hobby (*F. subbuteo*) and kestrel (*F. tinnunculus*) demonstrating that the loci will provide powerful genetic markers in these falcons too.

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

We used two different methods to estimate the density of nesting Peregrine Falcons (*Falco peregrinus*) across different parts of northern Eurasia. In the "territory-density" method, we extrapolated our density estimate of 406 km² per territory (95% CI = 295 to 650 km² per territory) in a high-density area, the Pyasina basin on the Taymyr Peninsula, to other similar areas across the range defined by published estimates. To estimate numbers in low-density areas, we used published data that suggested that Peregrine Falcon territories occur every 1,000 km². Based on the nesting association between Peregrine Falcons and Red-breasted Geese (*Branta ruficollis*), we used a second, post hoc method to provide a comparative estimate where the ranges of the two species overlay. This model was based primarily on the population ecology of the Red-breasted Goose and included parameters such as the proportion of the goose population nesting with peregrines, the proportion of peregrine pairs associated with geese, goose population size, and three other variables. Some of these variables were already known, whereas others had been estimated as part of another study. The territory-density and nesting-association methods led to estimates of 1,586 (95% CI = 991 to 2,179) and 2,417 (95% CI = 1,306 to 3,528) falcon territories, respectively, across the common range of Peregrine Falcons and Red-breasted Geese; the first method suggested a population of 3,652 falcon territories (95% CI = 2,282 to 5,018) across the entire range of *F. p. calidus*.

Samour, J.H. (2000) *Pseudomonas aeruginosa* stomatitis as a sequel to trichomoniasis in captive saker falcons (*Falco cherrug*). Journal of Avian Medicine and Surgery. 14(2):113-117.

Twelve adult female saker falcons developed reduced appetite, progressive weight loss, and unilateral or bilateral sinusitis. Nodular white or yellow caseous lesions were visible on the oropharynx and tongue of all birds. One falcon had 2 caseous masses on either side of the tracheobronchial synrinx, resulting in severe tracheal stenosis. All 12 birds had a history of mild to moderate trichomonal infections 3-4 weeks before examination. In all birds, bacterial culture of samples from these masses yielded pure growths

of *Pseudomonas aeruginosa*. The birds were treated with a combination of piperacillin (100 mg/kg) and tobramycin (10 mg/kg) administered intramuscularly q12h for 7 days. Oropharyngeal lesions were debrided, and the oral cavity of each bird was sprayed with a 1% povidone iodine mouthwash preparation. In birds with unilateral or bilateral sinusitis, a solution of 0.2 ml of a 5% chlorhexidine gluconate preparation diluted to 20 ml with sterile saline was used to flush the affected sinus q12h for 3-5 days. Tracheal masses in the one falcon were removed by curettage during tracheoscopy. Oropharyngeal lesions in all birds were completely resolved within 8-18 days of treatment. Trichomoniasis coupled with stress during the training and hunting seasons may have predisposed these falcons to infection with *P. aeruginosa*.



Conference Announcements

The 6th Congress of the Association of Avian Veterinarians

European Committee Meeting and the 4th Scientific Meeting of the European College of Avian Medicine and Surgery will be held in cooperation with the German Veterinary Society.

**March 7 - 10, 2001
Munich, Germany**

This will be a practically orientated scientific congress in English, with simultaneous English - German translation.

For registration information contact:
Dr Marion Böhm, Meschendorfer Weg 8,
D - 85716 Unterschleissheim, Germany.
Tel. (089) 310 58 14, Fax: (08084) 941 35,
Email: aav-munich-2001@gmx.net
Internet: <http://www.cvm.raptor.umn.edu>.