



FALCO

The Newsletter of the Middle East Falcon Research Group
Issue No. 12 August 1998

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SPECIAL WWGBP CONFERENCE ISSUE

FALCO is published quarterly 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 author and not necessarily shared by the editors.



Editorial

Welcome to issue 12 of FALCO, and greetings from your new editor, Helen Macdonald. After five years of tireless work as MEFRG Chairman, Jaime Samour, and his wife Merle, who edited FALCO, have moved to Riyadh, where they are setting up the Fahad bin Sultan Falcon Center. The new Center should be fully operational by the end of September. Although they will still be active members of the MEFRG, your new editor is Helen Macdonald of the UK Falcon Facility of the National Avian Research Center, Abu Dhabi.

The MEFRG plans to produce future editions of FALCO in English, Arabic and Russian. This should allow the newsletter to link falcon fieldworkers, veterinarians and scientists more closely and to improve communicative links between research projects and institutions worldwide.

Over the past year the MEFRG has gained many new members from countries as far afield as the west coast of the USA and Australia. Much of this issue is devoted to explaining the MEFRG, its related projects and programmes, for our new members. We have a unique readership: from professional falcon biologists to veterinarians, falcon breeders and falconers in many countries. This range is our strength. The situation surrounding falcons used in Arab falconry is a complex one and we need input from all sides to achieve a clearer picture of the current situation.

Please send us your contributions, and please participate in our technical and scientific activities. We look forward to hearing from you.



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 workshops on veterinary medical aspects, falcon biology topics, falconry and conservation issues.

International Conferences on veterinary medical aspects, falcon biology topics, falconry and conservation issues.

To publish:

Joint papers on aspects of falcon conservation, falcons and falconry.

A quarterly 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.

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The NARC Falcon Programme 1998

Helen Macdonald

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Since its formation in 1989, the National Avian Research Center Falcon Programme on falcons affected by Arab Falconry has expanded to include collaborative field projects on falcons in eight countries, migration studies, training courses in falcon welfare, and a successful domestic falcon breeding programme in the UK.

Domestic breeding

NARC's domestic breeding project is based at its UK Falcon Facility. Here, sakers, gyrfalcons, peregrines and hybrid falcons are produced for Arab falconry as part of an attempt to lessen the pressure upon wild falcon stocks caused by wild-trapping of falconry birds. This strategy is beginning to show results. Many Arab falconers now prefer captive bred falcons, having mastered the particular training techniques required, and the demand for wild caught falcons is decreasing every year. In 1997, wild-trapped falcons for sale at falcon dealers in Peshawar, Pakistan, were half the price of the year before. There are still problems. Wild falcons are still commonly used in Arab falconry and the origin of many birds is unclear. Many are smuggled into the Gulf states from as far afield as China and Siberia.

Research on falcons affected by Arab Falconry

Falcons used or affected by Arab falconry include the saker and 'altai' falcon *Falco cherrug*, the gyrfalcon *F. rusticolus*, peregrine (mainly *F. peregrinus calidus*) and the Lugger falcon *Falco jugger*. The latter is not used for falconry but as a decoy bird for trapping sakers and peregrines. Over the last decade new developments have further pressured wild falcon populations. Oil money in the Middle East has raised falcon prices; air

conditioning allows falcons to be kept from year to year rather than being released back into the wild at the end of the hunting season. Off-road vehicles have increased the scale and areas of hunting and of falcon trapping; political changes have opened up the Eastern bloc countries; increasing human pressure and urbanisation has reduced habitat for falcons and prey, and pesticides continue to contaminate ecosystems across Asia.

There are several ways in which pressure can be reduced on wild falcon populations. One is to provide an alternative source of birds for falconry through domestic breeding. Another is to work with trappers, falcon dealers and falconers to reduce captive falcon mortality through improved management and welfare, and by encouraging falconers to release unwanted sakers and peregrines at the end of the season.

Alongside these practical measures, monitoring of falcon populations in the range countries provides crucial data to be used as a baseline for conservation programmes.



THE SAKER IS AN EXTREMELY VARIABLE SPECIES. CERTAIN COLOUR-PHASES AND TYPES - SUCH AS THIS DARK FEMALE, ARE MORE VALUED THAN OTHERS FOR FALCONRY, WHICH MAY LEAD TO UNDUE PRESSURE BEING PLACED ON PARTICULAR POPULATIONS. FURTHER RESEARCH IS REQUIRED TO UNDERSTAND THE RELATIONSHIP BETWEEN SAKER TYPES AND BETWEEN SAKER AND OTHER DESERT FALCONS. ANSWERS WILL HAVE CRUCIAL CONSERVATION BENEFIT TO THE SPECIES.

Photo courtesy of Jeremy Anderson

Falcon Research Programme - fieldwork

NARC sponsors and coordinates the major international collaborative research programme on falcons species affected by Arab falconry. The projects fall into two categories: basic research on the saker falcon, and field research into wild falcon populations. NARC policy is to sign Research Agreements with national governmental or non-governmental bodies and to provide support for teams of scientists from the range countries to carry out fieldwork. Training sessions are held for new team members in the range countries and the NARC/ERWDA Handbook of Falcon Protocols ensures that data collection is standardised throughout the programme. NARC's fieldwork programme currently includes the following projects:

- **The Saker Falcon in Kazakhstan** (Research Agreement with the National Academy of Sciences, Republic of Kazakhstan).
- **The Saker Falcon in Russia** (Research Agreement with the Working Group on Raptors in Russia)
- **The Saker Falcon in the Kyrgyz Republic** (Research Agreement with the Central Board of Hunting and Hunting Administration of the Kyrgyz Republic)
- **The Saker Falcon in Mongolia** (Research Agreement with the Environmental Protection Agency of the Ministry of Nature and the Environment, Mongolia)
- **The Luger Falcon in Pakistan** (Research Agreement with Falcon Foundation International, Pakistan)
- **Arctic Peregrines (*Falco peregrinus calidus*) on the Taimyr Peninsula, Siberia** (in collaboration with the Extreme North Agricultural Research Institute, Norilsk)

NARC/ERWDA POLICY FOR STAFF AND CONTRACTEES

1. Researchers. Our policy is to train and support teams of biologists working in their own countries to monitor and manage falcon populations on a long term basis.

2. Data collection. We act as a central point to collate information obtained by these biologists using standardised procedures so that data from different sources are comparable.

3. Management. Only after field research has clearly identified what factors are depressing a falcon population do we attempt management such as installing extra nest sites, releasing captive bred birds, or pressing for changes in agriculture or laws.

4. Data security. There is considerable pressure on wild falcon populations from illegal trappers and nest-robbers. It is essential that our nest surveys do not attract the attention of nest-robbers and thus lead to an increase of falcons taken illegally. Sensitive data will only be circulated within our co-operating organisations on a "need-to-know" basis. Publication of data will be done in such a way as not to endanger breeding sites.

5. Eggs or live falcons. None of our staff or contractees are authorised to obtain falcons or viable eggs from the wild for any purpose during the course of their studies. Our falcon fieldwork is for research purposes only.

6. Illegal activities. Field-workers who obtain information on illegal activities concerning falcons are requested to relay it back promptly to Head Office and not to get involved with it or the local politics.

7. Publication of data. We support free publication of data provided that: a) it does not endanger the falcons by encouraging illegal robberies, and b) ERWDA is given full credit for its role in the research. We would normally expect to review all important manuscripts before publication and can provide our extensive bibliography of scientific references.

8. Liability. While we do our best to prepare personnel for fieldwork in the ERWDA Falcon Programme, ERWDA cannot accept any liability for injury, death, loss or damage, howsoever caused. Field-workers are responsible for their own safety and for their own insurance.



Falcon Research Programme - other projects

- Biodata of eggs, chick growth rates and food consumption. NARC has falcon egg and chick growth rate records dating back to 1984 for eggs from peregrines, sakers, gyrfalcons and hybrid falcons. Egg data are analysed to investigate correlations affecting chick production. Chick growth-rate data is useful for fieldworkers ageing wild falcon chicks.

- Pesticide and heavy metal analyses (in collaboration with the Institute of Terrestrial Ecology, UK and the Institute of Organic Chemistry, Milan, Italy) Using samples from NARC's fieldwork projects, investigates toxic contamination in Asian saker populations, in peregrines in Siberia and luggers in Pakistan.

- Phylogenetics of the Saker falcon complex (David Parkin, Jon Wetton: University of Nottingham, UK) Develops and tests genetic methods capable of discriminating between types and populations of sakers.

- Eggshell quality in captive falcons (Avril Edmond, Poultry Research Unit, University of Glasgow, UK) Conducts a microanalysis of the structure of eggshells from captive falcons to assess factors affecting shell quality and hatchability.

- Saker Morphometrics (Chris Eastham, UK Falcon Facility) This PhD project analyses morphomet



ric data from saker and other desert falcons to investigate the taxonomic relationships in this group.

- Literature database and Saker monograph (Helen Macdonald, Chris Eastham, Jevgeni Shergalin, Nick Fox, UK Falcon Facility) Bibliographies on the Saker, Falconry, the Gyrfalcon and peregrine falcon have been completed. A book on the saker falcon is being compiled using data from the Falcon Programme.

- Falcon diseases (Tom Bailey) This project provides research on falcon disease and preventive care, and the treatment of sick or injured falcons. A new avian veterinary hospital is under construction in Abu Dhabi. Research has also been carried out on the ethics of the production and use of hybrid falcons in falconry, and the ethics and feasibility of hybrid falcon sterilisation.

- PIT microchipping scheme This scheme tags wild and captive falcons with PITs (microchips) in a scheme designed to allow the movements of both wild and captive-bred falcons to be studied in detail. PIT tag and ringing recoveries are stored in the MEFRG's PIT central database.

- Key to the Birds of Prey of Kazakhstan (completed) A field guide in Russian to aid police and customs officials identify Kazakh raptors.

- Sheikh Zayed Falcon Release Project (Fred Launay, NARC) This annual release of ex-falconry sakers and peregrines is designed so that as much information as possible can be gathered on their dispersal and survival rates.

LEFT: THE SHEIKH ZAYED FALCON RELEASE PROGRAMME: RELEASING AN EX-FALCONRY SAKER IN THE KYRGYZ REPUBLIC

RIGHT: THE MORPHOMETRICS OF THE DESERT FALCONS: LANNER FALCON SKIN FROM THE NATURAL HISTORY MUSEUM, TRING. THE COLOUR CARD IS USED TO STANDARDISE PHOTOGRAPHS FOR THE PURPOSE OF ANALYSING VARIATION IN PLUMAGE COLOUR

Elasticated Leashes

Mike Nicholls

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During our researches during 1993-95 into the welfare of captive birds of prey, Ruth Cromie and I obtained indications that tethering can be a source of injury or distress. This information mainly came from veterinary surgeons who routinely treated birds of prey, and who noted that leg damage is more common in tethered birds than birds kept in aviaries. This seems to be an obvious conclusion and an equally obvious solution to this would be to 'free loft' flying birds, rather than, as in some cases we discovered, keep them permanently tethered.

However, as hawks must be tethered during at least some of their training, the use of elasticated, 'bungee' leashes rather than the normal non-elastic kind has been suggested as a way of reducing the force exerted on the legs. The idea is that the 'give' in the leash will dampen violent bates by absorbing some of the force and so put less stress onto the legs. No quantitative work had been carried out on this, however, so no evidence existed as to whether the 'bungee' leash works. So in 1995 two of my students, Julia Kennett and Andy Martin, undertook investigations into tethering for their degree project.

Two electronic strain gauges were built into a leash. One end of this leash was fixed to a perch and the other end was attached to the hawk by swivel and jesses in the normal manner. When the bird attached to the apparatus bated, the force exerted on the strain gauges was recorded electronically. By the kind co-operation of three Kent falconers the equipment was tried out on a variety of raptors and some owl species. The results were much as would be expected, with the bigger birds exerting greater forces and small birds, smaller ones. However, the results were not as simple as that might suggest. For example, a male merlin exerted a force equivalent to 7 times its

body weight, where in the male saker or Harris hawk, this force was only around 2 or 3 times its equivalent body weight. An eagle owl, on the other hand, much bigger than either diurnal bird of prey, exerted a force of only 1.3 times its body weight.

Table 1:

Forces associated with bates by a range of birds of prey (*note: forces are usually measured in Newtons, but a force can be thought of as equivalent to a weight at a rate of 1 Newton is equivalent to 100grammes)

Species and sex (m/f)	Mass in grammes (g)	Force as an equivalent weight in g	Force as proportion of birds' weight
Merlin (m)	148	1070	7.3 x birds' weight
Merlin (f)	194	1180	6.1
Barn owl	286	1490	5.2
Saker (f)	702	1490	2.1
Saker (m)	723	2010	2.8
Harris hawk (m)	728	2230	3.1
Harris hawk (m)	732	1930	2.6
Harris hawk (m)	757	2010	2.7
Peregrine (f)	833	1890	2.3
Common buzzard	919	1890	2.1
Bengal eagle owl	948	1240	1.3
Harris hawk (f)	950	2800	2.9
Harris hawk (f)	1015	2800	2.8
Harris hawk (f)	1020	2590	2.5

The second stage of the investigation was to test whether an elasticated, bungee leash succeeded in dampening the force applied to a hawk's legs. Several diurnal birds of prey (harris hawk, saker, common buzzard, peregrine) were each connected to the apparatus using an ordinary Terylene leash and, on a separate occasion, by an elasticated leash. The average force exerted on the hawk's legs using the normal leash showed results as before, with the larger birds exerting more force than the smaller ones in a fairly predictable way (table 2)

The force exerted by the bungee leash was sometimes less than that exerted by the ordinary leash. However, a statistical test on the data showed that the forces were not significantly different. This seemed to occur because the forces exerted in conjunction with the bungee were not predictable; there

Table 2:

Force associated with bates by a range of birds of prey using both bungee and non-elasticated

Species and sex (m/f)	Force exerted with 'bungee' leash in Newtons	Force exerted with non-elastic leash in
Saker (m)	14.9	15.3
Harris hawk (m)	22.3	23.9
Harris hawk (m)	19.3	18.2
Harris hawk (m)	20.1	22.1
Common buzzard	23.5	24.6
Peregrine (f)	18.9	13.6
Harris hawk (f)	28.0	15.6
Harris hawk (f)	28.0	23.2

was little relationship between the mass of the bird and the force exerted. This erratic behaviour of the bungee seems to be due to the recoil effect: once the bungee is stretched during a bate it attempts to return to its original length, tending to draw the hawk's legs with it.

So there is something of a paradox. An elastic leash can absorb some of the force of a bate, but due to recoil it does this in an unpredictable manner and the recoil can add further strain to the hawk's legs. To more closely investigate the forces involved, Andy Martin conducted a further experiment, using the same strain gauge apparatus but using weights rather than live birds. In this test situation he found that elasticated leashes can absorb more force than non-elasticated ones, but he also reinforced previous findings that there is a 'yo-yo' effect of recoil. Also, and not surprisingly, he discovered that the longer the elastic leash, the greater the degree of recoil; a long elasticated leash would tug back a hawk's legs more than a shorter one.

What was interesting though, was that a short bungee was very nearly as effective at absorbing the force equivalent to a bate as a long bungee leash, but had less recoil. The conclusion therefore is that a normal leash with a short, 'shock-absorber' of elasticated material is the best compromise and will absorb a proportion of the force of a bate, diverting it from the legs, but without the distressing recoil.

There are several designs for shock



absorber devices to be found in falconry texts which seem to be inspired by the rubber 'bumper' proposed by Harry McElroy in his book *Desert Hawking*. When hawks must be tethered, therefore, it would be wise to incorporate a short piece of elasticated material into the leash material but avoid leashes made entirely of bungee material. Neil Forbes writing in *The Falconers Magazine* (Spring 1995) advocates the use of a rubber vacuum cleaner 'fan belt' as a shock absorber, and this would seem to incorporate the features shown by Andy to be desirable as a bate dampener. There are more issues to tethering birds than the damage that may be caused to leg scales, bones and joints by violent bates and Neil Forbes also reports on these in his article.

Undoubtedly birds in training must be kept tethered for a proportion of the time, but those kept tethered and unflown for long periods (months or years) are wretched creatures. Fortunately, falconers are becoming more enlightened and choose to keep their birds free in their enclosures. Authors such as Philip Glasier in the UK and Harry McElroy in the US should be credited as taking the lead in recommending that trained hunting birds can be kept free in well designed enclosures.

Report

CITES Animal Committee Meeting, Caracas 25-29 May 1998

Tony Crosswell

Sneath Farm
High Green
Moulton
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Attendance

Tony Crosswell - Hawk Board (UK)
Frank Bond - NAFA
Christian de Coune - IAF
Marshall Myers - Pet Industry
Bruce Taubert - Association of Fish &
Wildlife Agencies
(also a falconer)

We all acted as a team for this meeting and between us managed to attend all the various group meetings, working groups, briefings monitoring all aspects of the discussions. This enabled us to then develop our own strategies for the handling of the subjects relating to our own agenda.

Subjects

Captive breeding
Tagging and marking of specimens
Invasive species
Infractions

These were the subjects on the agenda which were of concern to us as impacting upon falconry for the future.

Strategy

Some significant political developments seem to have occurred in the past few months. Chairman Hank Jenkins (Australia) was re-elected to office for 3 years with Sue Lieberman (US) having failed to get the chair but now being vice Chair.

This meant that Sue Lieberman had taken over captive breeding from David Morgan (EU). Frank Bond has in the past 6 months done a lot of work with Sue by going to Washington and involving himself in her office through her superiors and equals. In the working group we presented ourselves as a team and thus gained a lot of recognition

under her chairmanship. Our objective was to be gain NGO appointment to any ongoing working group.

When tagging and marking of specimens arose, we were again able to make several interventions through each of our group members and thus gained recognition as the most credible and knowledgeable user group. Our objective was to get appointed to the working group.

Captive breeding

The situation we faced was that with the existence of 8.15, falconry had an existing threat which had not been implemented but gave our opponents the means to stop our activities. Our objective was to gain a review of this whole subject and a redrafting or better a replacement for 8.15. The working group produced a report and all our goals were achieved. To our surprise, Chairman Hank Jenkins then formed a new, smaller working group with a new Chairman in Dietrich Jelden (Germany) and invited Tony Crosswell as the only NGO user group representative. The members are:-

Germany (Chair)
US (Sheila Einschweiler, Law Enforcement)
Chile
China
Africa
Bahamas
IUCN (NGO)
Greenpeace Mexico (NGO)
Humane Society of US (NGO)
British Falconers Club (NGO)

What this working group will be doing is to frame a new regulation which will define the criteria for the list of commonly bred species. When this is approved the next stage will be to create that list of commonly bred species on the basis of the criteria.

Marking of live Animals

Review of the use of coded microchips

This turned out to be quite a surprise as we were given a briefing by the main manufacturer Trovan Ltd who was so critical of the flaws in the system that the chairman's first response was to suggest rescinding the whole regulation

including them as approved methods for marking. Apparently some of the transponders can be reprogrammed from 3 ft away whilst still in the animal! However there were objections from the EU and others since they have already implemented the regulation and included the use of microchips in the marking process. The way forward was to form another working group and again we were asked to represent users on this.

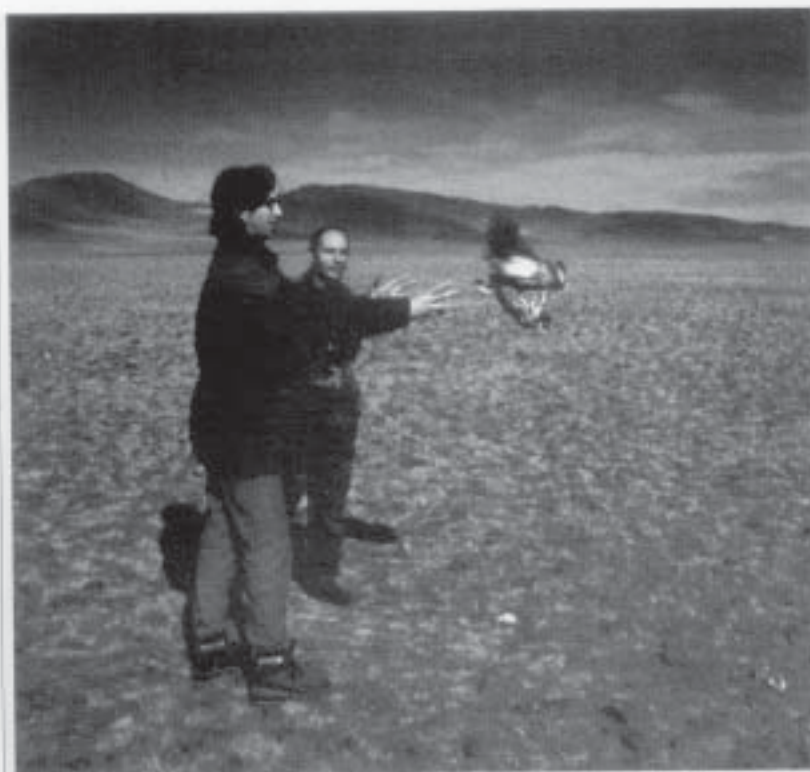
The working group consists of:-

Czech Republic (Chair)
Hungary
USA
Venezuela
France
Mexico
International Fish & Wildlife (NGO)
Zoos (NGO)
British Falconers Club (NGO)

The main difficulty is that the system is flawed and although the goal is to stop illegal trade, laundering, the technology actually enables this process but such is the belief in the power of regulation and technology that many parties are unwilling to face realities. Many countries face real smuggling problems but due to their own lack of development and finance they want to hang on to this kind of flawed technology approach.

Timetable

It can be seen that having got ourselves involved in the process we are now committed to a long series of meetings to achieve our goals. Captive breeding regulations will be next reviewed in the Animals Committee 1999. These proposals will then be submitted to the next COP 1999/2000. Development of the list of commonly bred species will then be started in Animals Committee 2001, approval in Animals Committee 2002 and submission to COP 2002/3. We therefore have to expect another five meetings to see this process through.



Satellite tagging sakers in the Russian Altai

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The objective of this October 1996 NARC expedition was to trap saker falcons in the Russian Altai region and fit two females with satellite tags to investigate their migration routes, of which little is known. Over ten days, the team (Valery Moseikin from the Saratov Institute, Nick Sanin, our translator Denis Bogolov and driver Michael) travelled over 300km by car and spotted 20 sakers, only one of which was juvenile. The majority of juveniles appeared to have already migrated.

The first two days were spent near the town of Maralikha to the west of the Altai mountains. This area is close to the Kazakh border, and we expected to see steppe forms of saker here. In those two days we saw three sakers - the first a dark juvenile female and the second



SATELLITE TAGGED
FEMALE SAKER
SHORTLY BEFORE
RELEASE

and third adult females. None appeared to be of the steppe form. We trapped the third saker - an adult, grey phase female which closely resembled a gyrfalcon. We took measurements and photographs for morphometric analysis, blood samples for DNA, pesticide and haematology studies. After taking these biomedical samples we fitted her with a PTT satellite tag before releasing her.

Diet

The main food for sakers in this area is believed to be susliks (Ground squirrel *Citellus citellus*) which were already in hibernation by September. This probably accounted for the low numbers of sakers and other raptors observed in this region. We decided to travel east, along the old Silk Route, through the mountains close to the

Mongolian and Chinese border where the mountain form of the saker is found. Here the saker preys heavily on puschukas (Daurian pika *Ochotoma daurica*) which do not hibernate, providing the saker with food all year.

Kosh-Agach

We travelled to the Kosh-Agach region and lived with an Altaian shepherd and his family for five days. Kosh-Agach is the main town here, situated in the middle of a 50km wide plain surrounded by snow-capped mountains. It is very dry in this region, with an altitude of around 6,500 above sea level. Houbara and stone curlew breed on this plain. We saw fifteen sakers on this plain and had difficulty trapping them due to the high numbers of Daurian pika present on the plain - we needed to be trapping by dawn, before the sakers had time to feed. Each day we travelled to the same location and each day we saw different sakers - pale, red and dark morphs, all in adult plumage.

We trapped an adult male and female which we believed to be a pair - the male a dark form and the female a pale form. We measured and took samples from both birds and the female fitted with a PTT satellite tag before release. As with the first satellite bird, the female's flight pattern was observed to be normal upon release, and both falcons flew away together.

We had originally intended to fit satellite transmitters to juvenile females only, as it is believed juveniles migrate a greater distance than adult birds in this region. Unfortunately we only observed one juvenile female and could not trap her so both were fitted to adult birds. We hoped to receive as much data as possible on migration routes by fitting one transmitter to a falcon in the west of the study area and one in the east. Sakers to the west of the Altai mountains are thought to migrate south into Kazakhstan and sakers to the east into Mongolia and China.

The sakers in this region are highly variable in plumage colour and pattern. We observed dark brown, light brown, dark blue, grey, red and pale forms. It is possible that we were observing birds

from different natal areas passing through the region on autumn migration. However, trapping a pair of adult sakers with completely different plumages implied that this is an area where different saker forms overlap. The Russian Altai is an area where the eastern steppe sakers' range meets the range of the western, mountain sakers' range. This could explain the high degree of polymorphism amongst birds from this area.

Results

Blood samples were analysed by Dr Jaime Samour, NARC, UAE, and by Grange Laboratories, UK. Normal values for white blood cells, erythrocytes and thrombocytes were found in all these birds. No blood parasites were found. Pesticide studies are being conducted by Lois Dale and Professor Ian Newton at the Institute of Terrestrial Ecology, UK. No results are ready at this time. Blood samples are being analysed by Dr David Parkin at the Department of Genetics, Queens Medical School, University of Nottingham, UK as part of an ongoing investigation into the phylogenetics of this species and its relationship to other members of the desert falcon group.

The three falcons trapped were all in good condition judging from their weight and the amount of muscle tissue that one could feel around the sternum. All sakers were large birds for their species with all measurements well above mean values on NARC's saker morphometric database. The second female we trapped was particularly interesting as she had a wing-shape more like a gyrfalcon, being relatively short in length but very wide (her wing width 14mm above the maximum previous recorded)

Saker 1

Sex: male
Wing length (P9) mm: 381
Wing width (S5) mm: 214
Tail length (mm): 198
Tarsus length (mm): 57.9
Digit 3 length (mm): 48.7
Weight in grammes: 1000

Saker 2

Sex: female
Wing length (P9) mm: 408

Wing width (S5) mm: 231
Tail length (mm): 220
Tarsus length (mm): 60.3
Digit 3 length (mm): 51.1
Weight in grammes: 1340

Saker 3

Sex: female
Wing length (P9) mm: 400
Wing width (S5) mm: 248
Tail length (mm): 225
Tarsus length (mm): 60.7
Digit 3 length (mm): 51.5
Weight in grammes: 1280

Migration results

At the time of writing (June 1998) it appears that one of the female sakers has either died or the satellite tag has become dislodged, as the signal has remained stationary for some months. The second female saker, however, moved from the trap site to spend the winter in China. This bird spent the winter in the Qilian Shen mountains of central China, first to the north-east of lake Quihai Hu, and then several hundred kms south of the lake before moving back to the area in which she was trapped. By 14 April she had returned to the original trap site, and at the time of writing appears to be still resident in this area.



Semen Quality in Captive Falcons

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Introduction

An attempt to cryopreserve the semen from a number of different falcon species was made during the 1998 breeding season at the National Avian Research Centre's Falcon Facility in Wales, UK.

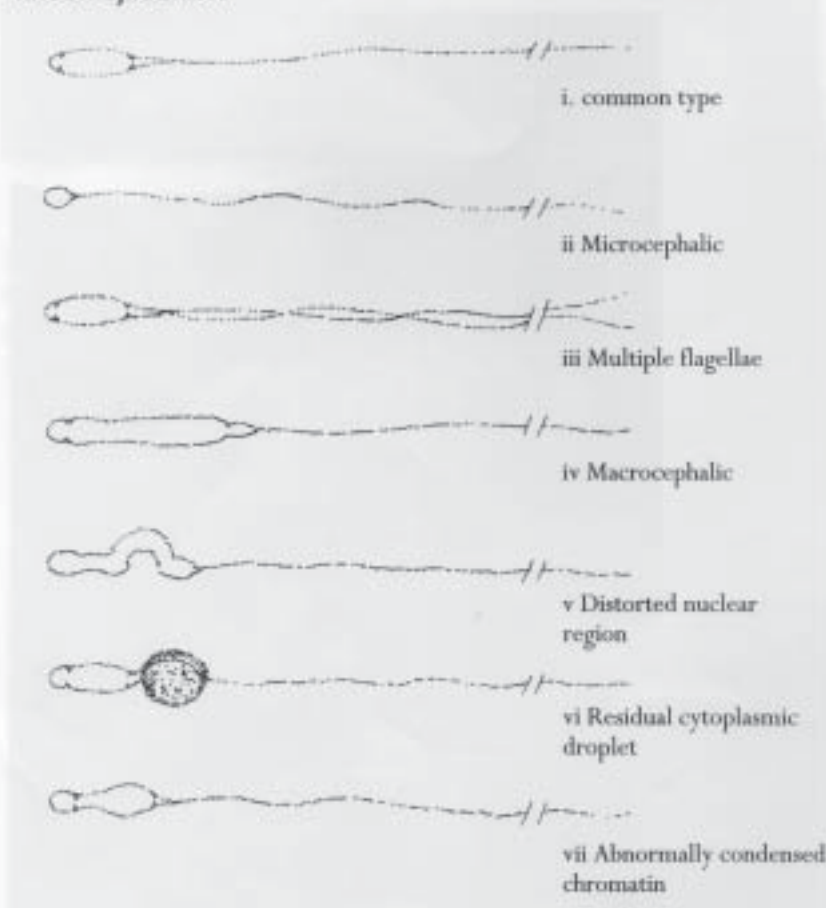
The storage of sperm for indefinite periods of time offers many logistical advantages to aviculturalists and allows the formation of germplasm storage facilities for the conservation of rare genetic material. Cryopreserved semen from American kestrel *Falco sparverius*, peregrine falcon *F. peregrinus*, and a number of other avian species has been used to produce viable

progeny but the methods used to freeze the sperm are laborious and expensive.

An alternative methodology (pelletisation) which is less technologically demanding, amenable to field conditions and extremely rapid has been used to preserve the viability of golden eagle *Aquila chrysaetos*, houbara *Chlamydotis undulata* and the domestic fowl spermatozoa but was unsuccessful in maintaining the viability of sperm from peregrine, gyrfalcon *F. rusticolus* and a number of hybrid falcons.

The following article relates to observations of ejaculate quality from a number of different species of falcon held in captivity at two separate localities. Macro and microscopic examination of the semen's colouration and contents, a review of published observations made by researchers in the United States indicate that semen quality in captive falcons is characterised by the presence of pleiomorphic sperm types, anucleate globular bodies, multi and mononucleated globular bodies. The existence of these entities within falcon semen suggest abnormalities in the processes controlling spermatogenesis.

Figure 1.
Examples of the diversity of sperm morphology within falcon ejaculates



Summary of Methods

In order to analyse the viability of spermatozoa eosin-stained smear preparations were made from fresh semen. Morphology of spermatozoa was examined by fixing semen in 10% formaldehyde solution and staining with diamidinophenylindole (DAPI) in order to visualise DNA under fluorescence microscopy at x400 and x1000 magnification. Fresh ejaculates were analysed for the percentage of motile spermatozoa present and the concentration of spermatozoa in the semen. The volume of each ejaculate was estimated by with a volumetrically calibrated pipette tip.

Summary of Observations

Ejaculates were transparent pale-yellow to ochre in colour and their viscosity was high. All ejaculates contained morphologically normal (fig.1.i) and abnormal spermatozoa (figs.1.ii-vii), the presence of round bodies (Rbs) was also common to every sample examined (figs.2i-v). Visualisation of DNA in DAPI-stained samples revealed

that most of the bodies were anucleate, however the existence of nucleate and multinucleate bodies was also recorded. Single spermatozoons were clearly defined within numerous other Rbs. A comparative semen sample from a peregrine held at another locality in Scotland showed similar characteristics. Gyrfalcon ejaculates contained fewer Rbs and a less pleiomorphic sperm population than ejaculates from peregrines.

Characterisation of the Rbs

The presence of single spermatozoons inside some of the Rbs and the presence of nucleated Rbs led to the hypothesis that these entities were germinal cells from the adluminal epithelia of the seminiferous tubules. A comparison of cells prepared from a quail testicle further indicated the likelihood of this hypothesis. It was concluded that the nucleated Rbs were developmentally precluded sperm cells.

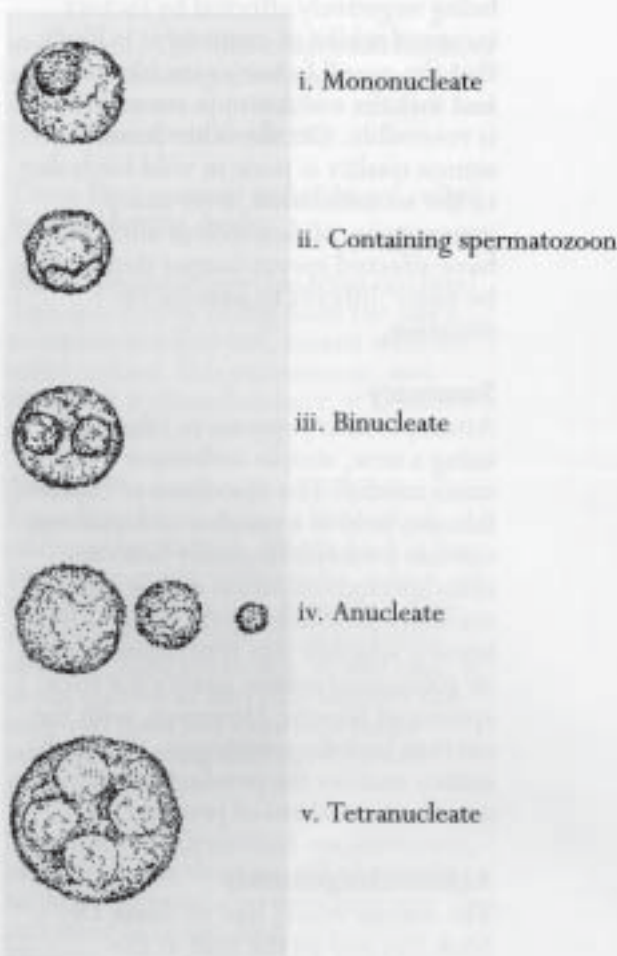
The shedding, or exfoliation, of immature sperm cells from the epithelia of the seminiferous tubules suggests that the spermatogenic machinery of the captive falcons is dysfunctional and it is likely that this dysfunction is intimately linked to the high degree of pleiomorphism seen within the ejaculated sperm population. This may also account for the apparent fragility of the sperm during the freezing and thawing stages of cryopreservation by pelletisation.

Published descriptions and consultation with research workers in the USA regarding the semen characteristics of American kestrels and peregrine falcons indicates that the incidence of poor semen quality in falcons is relatively widespread.

Other examples of poor quality semen

Other cases of poor semen quality in animals are not uncommon. The semen of a number of felid species (cheetah, lion, leopard, puma and Florida panther), free-living koalas and elephants has been evaluated in some detail and there is a consistently high degree of pleiomorphic sperm seen in their ejaculates. The presence of anucleate globular bodies is also noted in koala and other species and there is

Fig. 2 Examples of the various round bodies observed in falcon ejaculates



some suggestion that they represent drops of cytoplasm that have become pinched-off from the prostate gland. However, this would mean that their origin in falcons (and other birds) is different because birds do not have a prostate. Their origin remains unclear.

Poor semen quality in the species mentioned above is linked to lowered reproductive fitness within a population caused by the inbreeding of individuals that exhibit a high degree of relatedness. This lowered fitness makes these organisms especially sensitive to other factors that are known to negatively affect spermatogenic output such as toxic insult via infections or the ingestion of environmental pollutants.

It remains to be seen whether or not captive falcons are exhibiting poor semen quality as a result of factors incurred whilst in captivity or whether poor semen quality is a result of inbreeding in wild populations driven by the scarcity and isolation or bottlenecking of a species. An examination of semen quality in wild

falcon populations is required to answer this question. If semen quality is being negatively affected by factors incurred whilst in captivity it is likely that the causal factor(s) are identifiable and that the reduction in semen quality is reversible. On the other hand, if semen quality is poor in wild birds due to the accumulation, over many generations, of deleterious alleles that have affected sperm output then it may be more difficult to address the situation.

Summary

Attempts to cryopreserve falcon semen using a new, simple technique were unsuccessful. The ejaculates of captive falcons, held at a number of locations, contain a morphologically heterogeneous sperm population and developmentally precluded germ cells. It is not known whether this represents normal or subnormal semen quality for these species of falcons. However, with the current breeding strategies, the fresh semen enables the production of excellent numbers of progeny.

Acknowledgements

The author would like to thank Dr. Nick Fox and all the staff at the National Avian Research Centre Falcon Facility in Wales.



Clipped Wings: extracts from the press

Report by Azaeva Evalina from
Komsomol'skaya Pravda
newspaper, 4/9/97.

Contribution by Jevgeni Shergalin

'At Omsk airport police have seized a group of foreigners attempting to export saker falcons hidden in boxes to the United Arab Emirates. The people arrested were from Syria, Sudan and Morocco. This is not the first time these visits have been made to Russia to trap birds. Falcons trapped in Khakasia, Tuva are sold in their hot countries for 100-200,000 US Dollars. In this case, police removed 47 birds from the boxes. They were taken to the Zoo, and criminal charges were made against them. Police informed that the thieves had not ill-treated the falcons. Cases have occurred where smugglers have hidden birds under their coats, having given them large quantities of alcohol to keep them silent.'

Extract from 'New Falcon
Programme takes flight' Report
by Tariq Khonji from Gulf Daily
News, 21.3.98

'A Bahraini bird curator is pioneering new techniques for breeding falcons in the Middle East's scorching temperatures. In the past five years, Naseem Mohanna, curator at the Sulman Falcon Center and Al Areen Falcon Center, started breeding Gyr falcons which are normally found in very cold areas. Mr Mohanna said the first Gyr falcon was bred at the Sulman Falcon Centre in 1996. It was the only one bred until the latest six were bred this year.'

The six new chicks were born at the Sulman Falcon Centre under Mr Mohanna's watchful eye.'

The Saker Falcon

Adapted from the *Baz-Nama-Yi Nasiri*, a Persian treatise on falconry

Written by Taymur Mirza, trans.D.C. Philpott

The *Baz-Nama-Yi Nasiri* was written in 1868 and is undoubtedly one of the world's greatest works on falconry. In this section, Mirza discusses the various types of saker falcon, traditionally classified as either *Balaban* (passage sakers) or *Charkh* (eyass sakers).

The Saker Falcon

Kabidi - this first race or variety has a white head with no malar stripe or dark markings under the eyes. Apart from this, the coloration is dark: both body and tail feathers are without spots. It is large, bold in nature, and good for either crane or gazelle, but unfortunately, it is scarce. In the whole of my experience I have met with only one.

Balaban-i-Farsi. Next is the *Balaban-i-Farsi*, or 'Saker of Fars' which is subdivided into the red and the white varieties. Neither have malar-stripes. The back, from the neck to the preen-gland, is covered in spots and markings: the redder these are in colour, the better the bird. The flight-feathers, seven in each wing, are also spotted. The feet are a light slate colour. The darker and smaller the beak, tongue and talons, the better. The feet are lean, the legs short, the thighs stout, the chest and back broad, the wings fine and pointed, the eyes deep-set, the eyebrows prominent. The neck is long, the forehead broad and the 'waist' small. If the hawk has all these points, it is incomparable.

Balaban-i Ahmari-i Sham. Next is the *Balaban-i ahmar-i Sham* or the 'Red Syrian Saker', of which there are two varieties, red and black. In a good bird of this race, the two central tail feathers (which the Arabs call 'amud' or 'props' and the Turks call 'qapaq') along with the two outermost tail feathers, should have no spots or markings.

Balaban-i-Badri. This next race is called *badri*. It has a white head and no cheek stripe. Its overall colouration is reddish and it has an unmarked back

and breast. The two centre tail feathers are sometimes spotted and sometimes not: if they are spotted, the smaller and redder the spots the better.

These four races or varieties are called *hurr safi* by the Arabs.

Badu-pasand (precise term unclear). This is a variety of the *badri* but has a completely white tail, mixed with no other colour. It is uncommon, and though it is classed as *hurr*, it is poor-spirited and not prized.

Jibali. The next race is called the Mountain Saker. It has a little black only, under the eye. On its back it has two, four or six white spots, which are termed *Thurayya* (the Pleiades). The centre deck feathers are sometimes spotted, sometimes not. In any case, it is not classed as *hurr safi*, because the *hurr safi* must not only lack malar stripes, but must also show certain other features.

The first four described are, however, all included in the *hurr safi*. According to Arab falconer's terminology, the *hurr safi* must have the back 'free from Pleiades', the centre-deck feathers 'clear of marks' and the two outside tail feathers, one on each side, 'free from stain.' Also it must have no cheek stripe, or black under the eyes. If the hawk does not conform to these points, then they class it as *jibali* and not as *hurr safi*.

Balaban-i-Lafif. Next is the *Balaban-i lafif*, of which there are three varieties: the yellowish, the dark and the light. All three have cheek-stripes or dark feathers under their eyes. As in the case of the eyass *charkh*, if this race is taken from the nest, it is called in Turkey, *aitalgi*, in Arabic, *wachari*, and in Persian, *charkh*. If it has left the nest and is caught in a net, it is called, in Persian, *balaban-i lafif*.

Now, as for those four races described above as *hurr safi*, I have in my many travels and constant enquiries, never met any hawk-catcher or sportsman who has taken a *hurr-safi* from the nest. No-one even knows in which country these birds breed. All I know for certain is that they come to us from across the sea, in early autumn, from the direction of Muscat and Bahrein.

Only God knows where they breed and whence they travel. Those that I have seen in Persia, Turkey and Europe have all been *lafif* and all have had malar stripes.

The *lafif* is to the *hurr safi* what the *tarlan* is to the *qizil*, or what the Nejd horse is to the Turkoman pony. The *hurr safi* improves with each moult, but the *lafif* flies well for three seasons at



THE COVER OF A PERSIAN MANUSCRIPT DATING FROM 1845 SHOWING A PORTRAIT OF PRINCE QADJAR AND HIS FALCON

most, after which it becomes cunning. I have, at the moment, two *balaban* belonging to the *hurr safi* race, one of sixteen and one of seventeen moults; one is 'Persian' and the other 'Red Syrian.' Both are still excellent at common crane. Birds of this race improve from year to year throughout their life, because they are noble in nature.

The *Balaban-i lafif* of Baghdad. A variety of the *lafif* that I have only met with in Baghdad is called by Baghdad falconers, *Wachari*. Its general colouration is dark, with a tinge of red on the head. The flight feathers are dark

in colour and long - extending beyond the tail. It has small feet and the female is about the same size as the tiercel of the *eyass charkh*. It is very fast, nearly as fast as the *shaheen*. It takes the small black and white crow, the black partridge and stone curlew with ease. I have seen a few which would take *Houbara*. It looks very much like the *Hobby*, which is found around Tehran.

The *eyass Saker Falcon*

There are four kinds of *eyass charkh*. First, there is a variety which breeds in the Spring in the hills of Persia and Turkey. Another is found in Nejd, in Turkish territory, where it lays its eggs on the bare ground, like the black-bellied sandgrouse and *houbara*. This variety is called *charkh-i mani'i*. Another kind nests in the hills and wadis of Nejd. From these places, the Arabs obtain nestlings and call them *Hijazi*.

All these kinds are termed *charkh* if they are taken from the nest, and if they are snared after they have left the nest they are *lafif*.

The *charkh-i mani'i* is exceptionally good - for gazelle, or crane, or golden eagle - you can train it to take anything. I can confirm that it is faster than the *shaheen*, because I have often flown one at crane in a cast with a *shaheen*, and it has reached and bound to the crane a long way ahead of it.

The *mani'i* varies in colour, but the variety which has very red markings on its back, like a kestrel, is the best. Of all the *charkhs* of the world, the *mani'i* with red spots on the back is best. Although it is an *eyass (charkh)* and has been taken from the nest, it is equal to any noble passage falcon (*balaban*) of the *hurr safi* race. It can be obtained only from the Arabs of Unayza. In that dry part of Arabistan, its chief prey is *houbara* and hare.

Conferences

Incubation and Fertility Research Group

1998 Meeting - University of Warwick
September 15th and 16th

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Conference of Research Workers in Animal Disease

1998 Meeting - Chicago, USA
November 8-10

The Conference of Research Workers in Animal Diseases (CRWAD) is an organization with the sole purpose of discussing and disseminating the research advances in animal diseases. It is a non-profit organization, and has been so since its first meeting in 1920. There is an annual meeting each November where research scientists from around the world present their recent research in oral or poster presentation formats. The meeting averages 750 in attendance, and 400 presentations.

The 1998 CRWAD Meeting will be held November 8 - 10 at the Congress Plaza Hotel in Chicago, Illinois. The meeting will begin with the Researchers Reception, Sunday evening. The research presentations will begin Monday morning and will end Tuesday afternoon at 5 pm. Attendance is limited to members, participants on the program and guests invited by the Council. If you desire to present at the Annual CRWAD Meeting or want an invitation to attend please contact Dr. Robert P. Ellis .

For further information on membership and meetings please contact :

Dr. Robert P. Ellis
CRWAD Executive Director
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Email: rellis@cvmb.colostate.edu
URL: <http://www.cvmb.colostate.edu/microbiology/crwad/crwad.htm>

5th International Workshop in Videoscopic Surgery and Endoscopic Diagnostics for Veterinarians

1998 Meeting - Norderstedt, Germany November 9-11
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