FALCO

The Newsletter of the Middle East Falcon Research Group
Issue No. 15 January 2000

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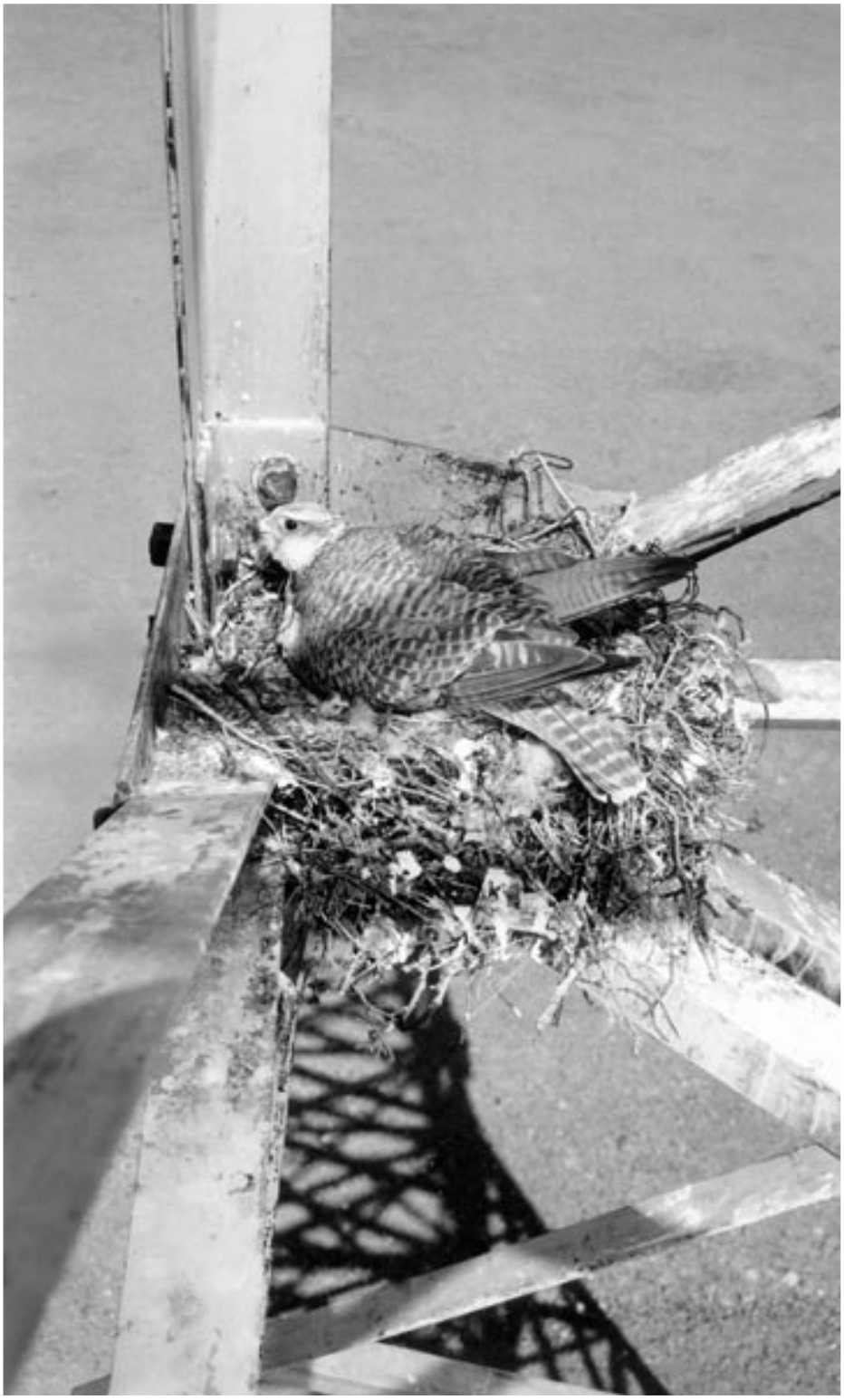

FALCO is published biannually and contains papers, reports, letters and announcements submitted by Middle East Falcon Research Group Members. Contributions are not refereed: although every effort is made to ensure information contained within FALCO is correct, the editors cannot be held responsible for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

Call for microchip and ring recoveries

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

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

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

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

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

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

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

Nigel Barton
MEFRGPITand Ringing Scheme Co-ordinator

MEFRG Objectives:

To provide:

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

To promote:

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

To Hold:

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

To publish:

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

Membership:

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

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

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Editorial

What do the first years of the New Millen[illegible]ave in store for falcons and falconry? How will [illegible]falconry evolve in an environment where both hunting grounds, free-living falcon populations and quarry populations come under new pressures? How will the MEFRG contribute to solving some of these thorny issues? Since its inaugural meeting in 1994 in Abu Dhabi at which a small group of biologists and veterinarians were present, the group has grown to include 130 members in 20 different countries. Many members actively support the objectives of the MEFRG. Emphasis has always been on forming a 'working' group with practical objectives in mind. From those small beginnings, projects have been developed in Asia and the Middle East, environmental agencies have been established and international organisations are becoming involved as the issues spread across international boundaries.

This issue of FALCO includes more aspects of the group in which veterinarians are closely involved. On a daily basis they treat falconers' birds and help to increase awareness of disease and management problems in the falconry community at large. New hospitals are opened, new treatment protocols are developed, new vaccines are produced and our understanding of health and disease is enhanced through research. Examples of each of these can be found in this issue of FALCO. Besides keeping falcons healthy during the hunting season, falcons that are released at the end of the season are examined, their health and fitness is assessed and release methods are developed to maximise their chances of subsequent survival. From the time falcons arrive in the Middle East to the time they are released back to the wild, the 'hands on approach' of veterinarians means that they are able to contribute to a variety of the groups objectives.

From an ecological perspective, projects in Asia are already well-established and are providing useful information on Saker Falcon biology. This knowledge will enable us to develop measures allowing the sustainable use of this resource from certain regions, while at the same time protecting the Saker in parts of its range where it may be threatened. Many of these projects are still in the early stages of development and there are still many questions to be answered relating to taxonomy, distribution and life-history parameters.

As a supplement to this issue we have included a document on the MEFRG microchipping project. It serves as a good example of how co-workers from a range of disciplines working in different countries can collaborate as a group to achieve their objectives. It emphasises the fact that we are dealing here with species, which under international regulations can only be traded through legal and recognised channels. Countries that become signatories of these international agreements must ensure that they fulfil their obligations. We are still a long way from controlling illegal trade in falcons, but the basis is there for monitoring programmes to establish the necessary baseline data in ensuring the sustainable use of falcons in Arabia whilst at the same time supporting the interests of the source communities. We would like to close by thanking all of the veterinarians, biologists and falconers who have contributed in the past to the microchipping scheme and we look forward to working with you in 2000.

The Editors.

The National Avian Research Center opens a new falcon hospital in Abu Dhabi.

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The National Avian Research Center (NARC), is a center of the Environmental Research and Wildlife Development Agency (ERWDA). NARC's flagship species are the Houbara Bustard (*Chlamydotis undulata*) and Saker Falcon (*Falco cherrug*), the two most important birds in the traditional and skillful art of Arab falconry. The Center promotes the ecologically sustainable utilisation of the Houbara and Saker, and is formalising international conservation strategies for these birds.

In October 1999, NARC opened a new Falcon Hospital in Abu Dhabi to provide a veterinary service to:
1) the falconry community of Abu Dhabi.
2) the Houbara Bustard captive-breeding and restoration programme of NARC.
3) wildlife projects undertaken by ERWDA biologists.

The Falcon Hospital is located near the Abu Dhabi International airport. The Center represents an exciting new concept in falcon hospital design for the UAE. It is an integrated facility where 1) trained falconry birds receive modern medical treatment, 2) falconers are informed of the latest advances in the understanding of avian healthcare and 3) the conservation message of the Agency, the sustainable utilisation of falcons and Houbara Bustards, is promoted to falconers. Thus the new Avian Hospital is much more than a state-of-the-art veterinary center with quarantine wards, surgery, diagnostic imaging and diagnostic laboratory facilities. The hospital also incorporates a falconry awareness center/museum and features audiovisual links between cameras within the clinical areas of the hospital to the reception areas. These links better enable hospital staff to promote awareness of falcon health and diseases to the clients.

Falcon Healthcare
Falcons visiting the hospital receive a high standard of health care. The philosophy underlying the hospital is the accepted medical principle, that it is far easier to prevent diseases than to cure them. Consequently the hospital promotes a comprehensive preventive medicine programme. Clients are encouraged to bring their birds to the hospital so that health checks, anti-parasitic medication and vaccination against the most common infectious diseases in the Middle East can be regularly given. The center is also fully equipped with anaesthesia, endoscopy, radiography and surgical equipment to ensure that diseases are promptly diagnosed and that sick birds receive advanced medical treatment. The installation of the latest computerised record and information technology systems also ensures that the hospital is compliant with international standards of avian medicine. There are 40 fully equipped hospitalisation wards where sick birds can be isolated and individually treated.


Museum displays for educational awareness
Nick Fox


Trained staff with fully equipped treatment and surgery rooms.
Nick Fox

Diagnostic Laboratory Support
Hospital staff working in the in-house laboratory are able to conduct parasitology, haematology, blood chemistry, microbiology and some immunology investigations on medical samples collected from sick falcons. The ability to rapidly diagnose diseases on-site ensures that sick birds are quickly given the appropriate treatment. In addition, the hospital also liaises with specialists working at other regional and international laboratories to further scientific understanding of important diseases of raptors.

Veterinary Care for Threatened Wildlife
Veterinary staff from the hospital provide medical support to the Houbara Bustard captive-breeding project at the NARC Sweihan Research Center and also to ecologists working with diverse free-living species ranging from desert hares to marine turtles.

Improving Falcon Healthcare Through Research
The National Avian Research Center has successfully implemented a comprehensive biomedical research programme to improve the care and captive management of the Houbara Bustard. The Falcon Hospital will collaborate with regional and international institutions to develop an innovative research programme with the primary objective of improving falcon health and welfare.

Trichinellosis in raptors in the United Arab Emirates

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Trichinellosis in raptors, the infection with *Trichinella (T.) pseudospiralis* is very rare. Three papers report of an experimental infection in the American Kestrel (*Falco sparverius*) (Saumier *et al.*, 1986, 1988; Meerovitch *et al*., 1982) but there is no case report in the literature of natural trichinellosis in falcons. Trichinellosis has been described in the Marsh Harrier (*Circus aeruginosus*, Obendorf and Clarke, 1992), the Common Buzzard (*Buteo buteo*, Calero *et al.*, 1978), and the Cooper's Hawk (*Accipiter cooperi*, Wheeldon and Kock, 1982). Pozoi *et al*. (1992) isolated *T. pseudospiralis* from a Tawny Eagle (*Aquila rapax*) in Kazakhstan. Lindsay *et al.* (1995) found *T. pseudospiralis* in a Black Vulture (*Coragyps atratus*) from Alabama.

This short communication describes three cases of trichinellosis in Falconiformes necropsied at the CVRL, Dubai:
Case 1: Hybrid (Gyrfalcon x Peregrine) with chronic bumblefoot and chronic aspergillosis in June 1997.
Case 2: European Goshawk (*Accipiter gentilis*) with severe aspergillosis and capillaria-infection in October 1999
Case 3: Indian Peregrine Falcon (*Falco peregrinus*) with Clamydiosis (pericarditis) and *Caryospora*-infection in October 1999.

Macroscopically the pectoral muscles showed multiple submiliare, barely visible, grey spots (Fig. 1) in the deeper layers. Histology revealed in all three cases numerous necrotic, hyaline foci in muscle fibers. In some of them,

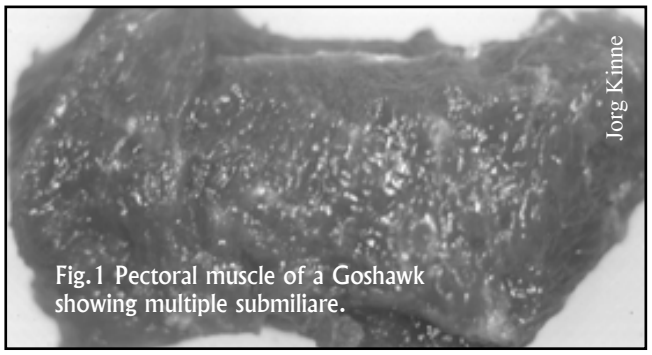

Fig.1 Pectoral muscle of a Goshawk showing multiple submiliare.

small coiled larvae were visible within the sarcoplasma of the muscle fibers (Fig. 2). In the proximity of the parasite the attached fibers were swollen and pale with loss of myofibrils. The number of parasites as well as necrotic areas was much higher in the pectoral muscle than in the leg muscles. Also, in case 3, *Sarcosporidia* cysts were found in the muscles. No parasites were found in the myocardium in any of these cases.

Discussion:
Of 219 falcons (1996 - 1999) in which the muscles were routinely investigated by pathohistology at CVRL, only 3 (1.34%) were positive for trichinellosis. Lindsay *et al.*

(1993) also found such low incidence with only one from over 100 raptors from south-eastern USA. The history of the 3 birds investigated did not give any details regarding their flight performance. However, it is thought that the numerous small lesions in the muscles, especially the pectoral muscles, may have a negative effect on flight performance due to muscle damage. Wheeldon and Kock (1982) believe that the clinical syndrome of "cramps" may be caused by trichinellosis. Saumier *et al.* (1988) described reduction of exercising, flying, elevated perching, and preening after experimental infection of American Kestrels with *T. pseudospiralis*. The presence of muscle larvae may reduce the competitive fitness of infected individuals. Saumier *et al.* (1986) also reported a reduced reproductivity in American Kestrels after experimental infection.

Wheeldon and Kock (1982) have not detected any gross lesions during necropsy. In our three cases, the pectoral muscles in particular showed barely visible, grey spots in the deeper layers. These lesions can be easily overlooked if no cuts are made into the deep breast muscle.

Similar to the lesions described in the Black vulture (Lindsay *et al.*, 1995) and in the Masked Owl (*Tyto novaehollandiae*; Randell and Reece, 1996) we found in all three cases numerous necrotic, hyaline foci in muscle fibers; some of them containing small, coiled larvae (Fig.2). A good differentiation between *T. spiralis* and *T. pseudospiralis* is the lack of a capsule (Wheeldon and Kock, 1982) in *T. pseudospiralis* as seen in our cases. Wheeldon and Kock (1982) also observed marked infiltration with mononuclear cells surrounding the larvae. Our cases revealed a chronic stage of parasitic invasion and no infiltration was observed. Lindsay *et al.* (1995) also did not detect any host inflammatory response and nurse cells. They found larvae in muscles of the trachea but not in the heart.

After experimental infection of American Kestrels with *T. pseudospiralis*, Saumier *et al.* (1988) detected the highest larvae-density in the leg muscles, whereas the number of parasites as well as necrotic areas in our cases were higher in the pectoral muscle than in the leg muscles. Despomier (1993) described that *T. pseudospiralis* induces an incomplete nurse cell. As a direct consequence of exposure to some of the parasites, the host develops long-lasting immu-

nity to reinfection. This has advantages for both the parasite as well as the host, because strong immune responses should reduce intraspecific competition.

The sources of infection are most probably some species of rodents, especially wild mice, as they can become experimentally infected (Lindsay *et al.*, 1995). A wild rodent host of *T. pseudospiralis* is the deer mouse *Peromyscus maniculatus* (Poirier *et al*., 1995). Poirier *et al.* (1993) analyzed the infection cycle in this mouse. On day 4 after infection, 35% of 400 inoculated *T. pseudospiralis* were recovered, with 91% and 9% found in the small and large intestines, respectively.

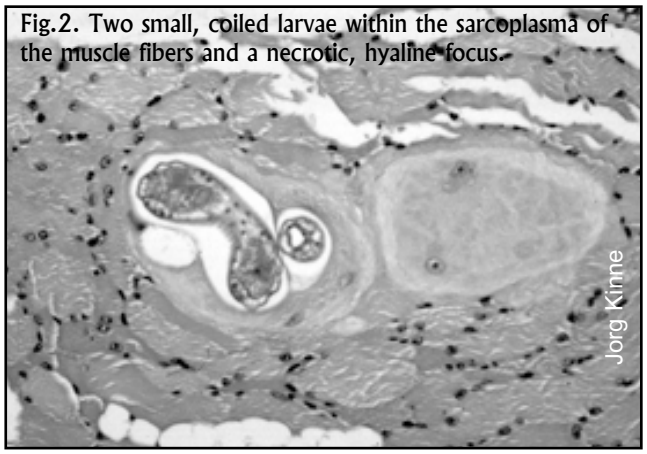

Fig.2. Two small, coiled larvae within the sarcoplasma of the muscle fibers and a necrotic, hyaline focus.

T. pseudospiralis seems to be relatively apathogenic in mice. Alkarmi *et al.* (1994) demonstrated that muscle twitch tension in mice infected with *T. pseudospiralis* was not significantly different from the control group. *T. pseudospiralis* infection might not only induce myopathy but Alkarmi *et al*., (1995) also described immunosuppression in experimental trichinellosis in mice. They showed that *T. spiralis* soluble secretory antigens were inflammatory and chemotactic, while those of *T. pseudospiralis* were not. The experimental infections with *T. spiralis* or *T. pseudospiralis* induced significant delays in skin graft rejection depending on post-infection time periods.

Trichinellosis may pose a greater risk in wild-caught raptors than in captive-bred birds as they are usually not fed on rodents. However, there is a potential danger of infecting captive falcons with *T. pseudospiralis* by feeding rodent species. Even so, the advantage of not spreading avian virus diseases (ND, Herpes, Pox) might be much greater than the risk of trichinellosis.

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Avian Paramyxovirus Serotype 1 (PMV-1) in the United Arab Emirates.

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Avian paramyxoviruses belonging to serotype 1 (ND or APMV-1) are known to infect 241 species of free-living birds (Kaleta and Baldauf, 1988). Over a period of 10 years CVRL has isolated 167 strains from 11 different avian species (Table 1). The strains were isolated on chicken embryo fibroblast (CEF) cells. The cell line used is either a permanent CEF cell line (Kaaden *et al.*, 1982) or a cell line that we produce from embryonated chickens. All viruses are freeze-dried and stored at CVRL. The strains are sent for further investigation to the International Reference Laboratory for NDV in Weybridge (UK). This laboratory uses different tests for the characterisation of the viruses (Manvell *et al.*, 1999). These investigations place all isolated PMV-1 viruses from the UAE into one of 6 groups (A, B, C, F, pigeon or unknown). As can be seen from Table 1, sixty one PMV-1 isolates derived from falcons are present in all 6 serogroups. During our investigations, it was found that the virus could be isolated from only 32.7% of the falcons displaying typical ND-symptoms. There could be many reasons for this phenomenon. CVRL found that many falcons suffered from ND despite proper vaccination with pigeon vaccines, and has therefore developed a PMV-1 vaccine (DuFaPa) for falcons that included strains of 4 of the 6 groups. When we used this vaccine in falcons, we have observed a sharp drop in birds suffering from ND. Unfortunately, very few serological investigations following the vaccinations of falcons have been done (Wernery *et al.*, 1995). This should be a future priority.

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Table 1. PMV-1 strains isolated from different avian species in the UAE over a decade.

		Groups						
	Avian Species	A	B	C	F	Pigeon	None	**Total**
	Falcon	1	16	17	8	4	15	**61**
	Pigeon	2	5	10	6	15	4	**42**
	Quail	0	0	9	1	1	5	**16**
	Houbara		0	5	13	0	0	0
18								
	Chicken		0	5	5	1	0	0
11								
	Partridge	0	0	2	1	0	0	**3**
	Peacock		0	0	3	0	0	0
3								
	Pheasant		0	0	2	0	0	0
2								
	Stone Curlew	0	0	1	1	0	0	**2**

Falconpox Vaccine

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In 1996, after a 4-year study, CVRL and Prof. Kaaden, Munich established a falconpox vaccine. Abu Dhabi supported this project both financially and scientifically. Therefore this vaccine has been named "Abu Dhabi Falcon Pox Vaccine (ADFA)" (Kaaden *et al.*, 1996). The pox strain was isolated from a falcon scab. The titer of the vaccine is 107.25TCID50. This vaccine has to be reconstituted and the birds subcutaneously vaccinated with 0.25ml. All falcons should be revaccinated 3-5 weeks later (booster vaccination). A pox vaccine can only be protective if the vaccine titer is greater than 107.0TCID50, and if the animals are revaccinated after 3-5 weeks (Mayr, 1999).

This is an attenuated vaccine that might give a life-long immunity against falconpox when vaccinated twice. Unfortunately, the vaccine could not be tested for its efficacy in a field trial, the reasons being a lack of experimental falcons and it was found impossible to infect naive birds with falconpox. During the 1998/99 season, ADFA was in great demand and CVRL distributed 1500 ADFA doses to 4 different centres. According to a falconpox vaccine questionnaire handed out to all 4 centres, 1062 falcons were vaccinated once with ADFA and 607 falcons received a booster vaccination. One centre reported mild falconpox in 2 birds several weeks after vaccination, and another centre experienced full-blown falconpox in 5 cases, 4 months after the booster vaccination. One hospital also reported periorbital hyperaemia shortly after vaccination in a few falcons, which subsided within 1 week. One centre reported that follow-up checks are difficult to achieve since many falconers visit different hospitals.

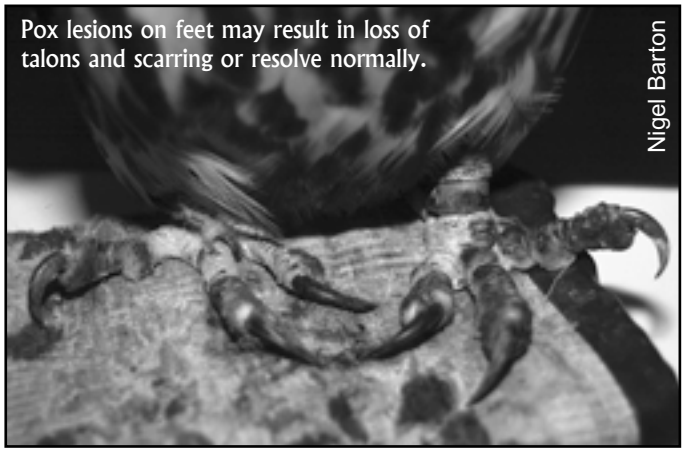
However, in general, since the use of ADFA, fewer falcons are seen with falconpox lesions. Further investigations are required to elucidate whether the reduction of falconpox is due to the use of ADFA, or if it is caused by seasonal cycles as observed with other pox epidemics. The new falcon (1999/2000) season has started and CVRL has so far released more than 1000 doses of ADFA. I hope that all centres will again complete our questionnaires.


Pox lesions around the eye and cere of a hybrid falcon.
Nigel Barton

In connection with other institutions, CVRL has now produced 5 different vaccines for falcons, which are:

1. Salmovac-F: *S. typhimurium* live vaccine.
2. DUFAPA: inactivated PMV-1 vaccine (including 4 different strains).
3. ADFA: Falconpox live vaccine.
4. Enterovac-F: Toxoid vaccine including 4 different fal con strains of *C. perfringens* type A/B.
5. DUFAHE: Falconherpes live vaccine.
(Wernery *et al.*, 1999)

CVRL has recently released a small brochure containing details about the above-mentioned falcon vaccines.


Pox lesions on feet may result in loss of talons and scarring or resolve normally.
Nigel Barton

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The Saker Falcon in Tuva

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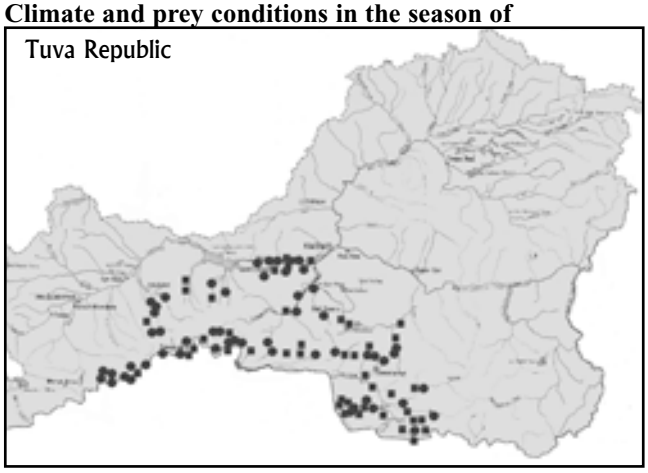
Introduction
During the period 1-26 June a research trip was made to the Tuva Republic by a fieldgroup of the Ural Animal Conservation Union as part of the project work planned for the Saker in Russia. The group used a UAZ 4wd vehicle for transport and visited various sites in search of Sakers. During the surveys we noted potential nest sites as well as the presence of falcons. In areas with good nesting potential, the territory was searched on foot in order to locate nests of Sakers. A total of 4120 km was covered by car surveys and 580 km by foot surveys.

In this study we determine 2 categories of breeding territory: 1) proven breeding (nest with chicks; fledged chicks close to the nest) and 2) possible breeding (a single adult near empty nest; a pair or an adult showing breeding behaviour).

Study area
Tuva Republic is located in Central Asia. It covers an area of 170,500 km^2 and has very diverse relief and vegetation. The entire north-eastern part of Tuva is upland covered by taiga forest with many lakes and it is bordered by western (2504m) and eastern (2892m, 3044m) Sayan ranges, and in the south by Tasksh (2615m) and Obruchev (2895m) ranges. This is a source of the Big Enisey river. South-east of Tuva is occupied by forested uplands limited from the south by Khormung-Taiga (3203m) and Sengilen (3276m). The Small Enisey has its source in these mountains. The western part of Tuva is occupied by the Altay mountains with Shapshalskiy (3201m) and Tsagan-Shibetu (3383m) ranges and Mongun-taiga mountain massif (Mongun-taiga mtn 3970m). In the centre of the Tuva there are a number of steppe depressions stretching from north to south: the northern most is Ukukskaya depression (806m) bordered in the north by the Nurtushbinskiy range, and from the south by Ukukskiy range, central Tuva depression (450m), bordered from the north by Alashskiy Uppland, Ukukshiy range, and Acad. Obruchev range, and from the south - by the ranges western and eastern Tannu-Ola, and Ubsunsurskaya depression (northern part),the largest part of which lies in Mongolian territory.

The territory of the Tuva Republic is hardly developed. The population size in 1993 was 309,000. Most of the Tuva people are traditional herders, which is why most of the steppes are grazed. About 70% of the steppes are suffering from overgrazing, especially the cold steppes of the uplands (Sagal valley). Most of the arable land is no longer cultivated, although there are some limited plantations of gramminoids in the Tuva depression. The disturbance factor in those habitats with good nesting potential is extremely low. The total area where Saker Falcons could possibly breed is 75,000 km^2.

Climate and prey conditions in the season of

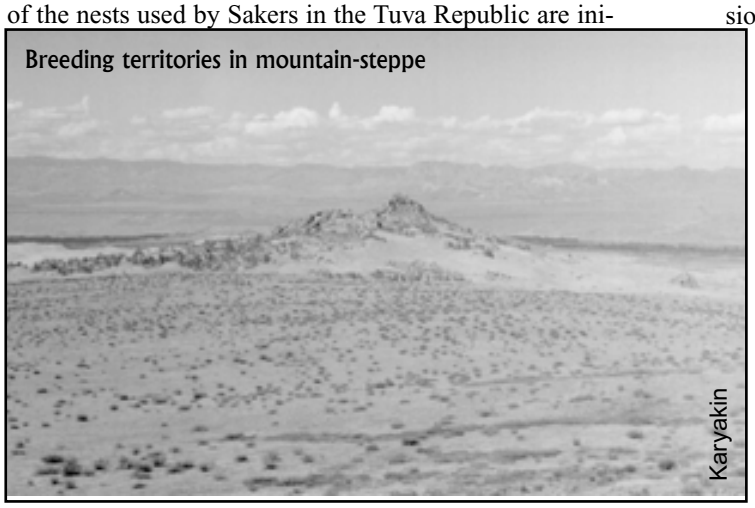


observations.
In 1999, spring in Tuva was early and dry. In the large depressions the snow had melted before the end of April and in the mountain valleys by the beginning of May. Warm, sunny weather dominated during May, increasing the temperature to 30°C and above. The first rain came at the beginning of June, after which it rained regularly every 2-4 days with intermittent gales and snow (during the second and third weeks of June). The last freezing temperatures were recorded on July 1st.

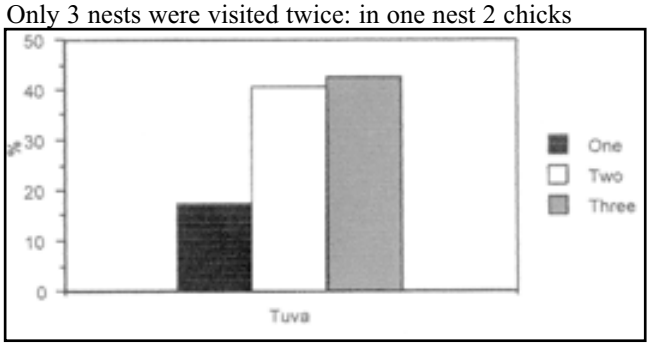
The greatest food availability was found in the steppe valleys of the Western Tannu-Ola and Tsagan-Shibetu (many susliks and pikas), and in the Tuva depression. In the Ubsungur depression, and in the deserted steppes of the left bank of Tas-Khem river the food conditions were bad. Susliks, gerbils and voles were virtually absent, and pikas had a moderate density only in large mountain massifs. As a result of this, there were recorded cases of cannibalism in all observed nests of Upland Buzzard (*Buteo hemilasius*) in locations away from the mountains. In 87% of the nests visited there was a total loss of the brood. Avian prey items dominated in the diet of breeding Sakers.

Results of the field work.
During the entire study period, (56 days) we recorded 177 adult Sakers, 90 fledglings and 27 chicks. We found 98 breeding pairs of Sakers (see map): 54 located nests (circles) and 44 possible nests (squares). All breeding territories were located in mountain-steppe and mountain-forest-steppe habitats and in deserted regions. The nests were located on steppe slopes with rocky outcrops or on pinnacles. Out of 54 nests, 17 contained chicks and 37 fledglings. Out of 44 possible nest territories, 37 had adults close to empty nests, 3 had pairs close to empty nests, and in 4 single Sakers attacked other birds of prey (vultures, Golden Eagles and Kites), or demonstrated 'alarming' behaviour.

88 nests found were located on rocks from 3 to 120 m high and were in old nests of Upland Buzzard (81), Raven (4), Black Kite (1), Golden Eagle (1), and in one case in the nest of Rock Dove (*Columba* sp.). The latter nest was on a wide flat rock ledge. All nests were fully or partially shaded by an overhang from above and from one or more walls from the sides. This allows us to conclude that most of the nests used by Sakers in the Tuva Republic are initially built by Upland Buzzard. The broods contained 1 to 3 chicks (see figure below).


Breeding territories in mountain-steppe
Karyakin

Only 3 nests were visited twice: in one nest 2 chicks



fledged out of a brood of 3; in another nest only 2 out of 3 chicks were alive at the time of the visit, and in the third nest 2 chicks fledged out of a brood of 2. In another 5 nests which were empty at the time of the visit, the nests contained white down and fresh faeces, and both adults were showing 'alarm' behaviour. The minimum distance between 2 active nests was 800 m (Yamlig range, left bank of Tas-Khem river, Erzinskiy admin. region).

Besides rocky areas, we surveyed 500 km of electric lines. We found 36 nests of Upland Buzzard on electricity poles, of which 29 were active. There were no signs of Sakers occupying any of the nests on the electricity poles. We also surveyed ribbon forests along the rivers (205 km), in which we found 43 raptor nests (Black Kite, Upland Buzzard, Booted Eagle (*Hieraaetus pennatus*) and Imperial Eagle (*Aquila heliaca*). None of the nests contained signs of Sakers. These facts lead to a conclusion that within Tuva Republic, Sakers prefer to breed on rocks. This is supported by the high breeding concentration of Sakers in the rocks amongst the steppes of Ubsunuur depression. We did not find Sakers in the eastern part of the Tuva depression, where there are not many rocks, despite a high density of Upland Buzzard, and some of the buzzards were nesting on the electric poles.

Discussion.
We classify 3 types of Saker habitats located in three landscapes. These are: 1) pinnacle-type mountains on the left bank of Tas-Khem river surrounded by deserted sandy steppes and sands; 2) cliffs close to rivers and rocky outcrops on the mountain slopes of the ranges dividing depressions or valleys; and 3) cliffs on the river banks in the Tuva depressions (cliffs along Enisey river and its tributaries). The breeding density in all suitable nesting habitats is more or less comparable at 0.5-1.5 pairs per 1 sq. km of mountain massif (1 pair per 1 km^2 on average). If you count the Sakers for the whole area (including all types of terrain), the density would be from 0.5 to 6 pairs per 100 km^2 (from 3 pairs per 1000 km (Sengilen) to 8 pairs per 1000 km^2 (Western Tannu-Ola), and is 5.5 pairs per 1000 km^2 on average (Enisey, Eastern Tannu Ola, left bank of Tas-Khem river). Extrapolating these figures for the whole territory of the Tuva Republic we estimate the total number of Sakers to be 370-390 pairs, 150 of which breed in the Tuva depression. However this estimate is approximate. More detailed information

could be obtained by analysis of the habitats using satellite shots in the GIS.

There are no changes in numbers of Sakers in Tuva. In the report of Baranov (1991) in the 70-80s in Saglin depression the Sakers were breeding in the same locations and in the same numbers as were observed during our field work. In the regions with unfavourable food conditions, some of the pairs did not breed but kept their territories, or they started to breed and failed but still maintained their territories (as we observed on the left bank of Tas-Kheem). According to the information from the ranges of the Ubsungur Depression Nature Reserve, on the southern slope of Yamlig mountain, Sakers were breeding in 3 territories, whereas in 1999 we found breeding only in one territory, and the other 2 territories were occupied, but no breeding was recorded.

Due to the very diverse conditions in Tuva, there are no deep depressions in food conditions in large territories (it might occur in a small part of the territory), and this does not affect the overall breeding performance of Sakers in the Republic. Also, unlike the Upland Buzzard, the Saker is not so dependent on small rodents, it can switch to a bird diet, as we saw in Tas-Khem area.

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Home ranges of Saker Falcons in Mongolia

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In summer 1999 Saker Falcons were radiotracked in central Mongolia (Potapov *et al.* 1999). This study aimed to find out the patterns of territory use in breeding falcons and whether there are any limits to the density set by territoriality. The study was carried out using conventional radiotelemetry methods using backpack transmitters with a ground-plane aerial (Biotrack Ltd., UK see Kenward 1987 and references therein). The weight of the transmitters was 24 grams, and did not exceed 2.5% of the bird's body weight. The signals were picked up by several radi-


Fig. 1

otracking receivers from 2, 3 or more triangulation points located on summits. Two AVM electronics radiotracking receivers (AVM Instruments, Livermore, California), 2 falconry receivers and 1 Mariner radiotracking receiver were used. Fixes were taken for every tagged bird at 15 minute intervals. A total of 15 students, mostly from the Faculty of Biology, Mongolian State University actively participated in the work. Bearings were taken using Silva magnetic compasses (Silva compass AB, Sweden) with an accuracy of 2°. The bearings were converted into co-ordinates using SAS (Statistical Analysing Systems) programmes developed by G. Wife with some changes (White and Garrot 1990). Home range sizes were measured using Minimum Convex Polygons (MCP) which were calculated and plotted for each day, as well as for the whole period of observations using the programme Home Range (Huber & Bradbury 1995-6) developed for Macintosh computers. Minimum Distances Moved (MDM) and overlaps were calculated using Wildtrack software (Todd 1992).

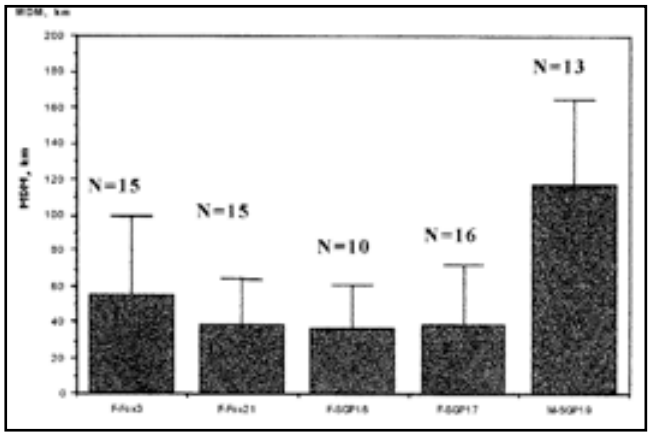
The MCP were plotted atop merged together and georeferenced to UTM48/WGS84 series of aerial photos (Mongolian Geodetic and Cartographic Management GUGK) with blended quicklooks of SPOT 4 images of September 1998 georeferenced to UTM48/WGS84 SPOT using cubic convolution so the colour boundaries are smooth. Pixel size for the used images is 145 m. Image processing was performed using ERDAS IMAGINE 8.3.1 for NT by O. Totubalina (Scott Polar Institute, Cambridge University).

The falcons were fitted with radiotransmitters in late May or early June. Four females and 1 male were radiotracked. In addition, 20 chicks were fitted with leg mount transmitters a few days before fledging. The radiotracking took place from 30 May to 7 July. Radio-tracking towers were located on the dominant summits and in addition a mobile radio-tracking station was mounted on a 4WD jeep. Fixes were taken at 15 min intervals simultaneously from all tracking stations in the pre-determined order (bird after bird 1 min apart). More than 300 fixes were obtained for each bird. All radiotracking observations took place in a study area in Dundgov aimaq (Central Gobi province of Mongolia, Fig. 1).

Minimum Distance Moved.

The adult birds showed a pattern of territory use typical of central place foragers: marked centre of activity close to the nest and radial hunting sorties. When chicks grew up and fledged, the single center of activity split into multiple centres which were located at the dominating summits and those slopes with good air turbulence.

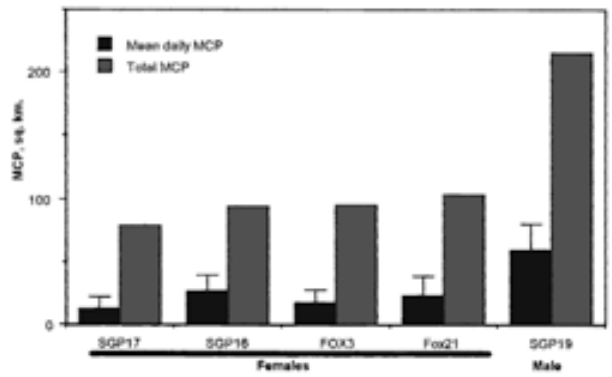
Averaged for the whole period of observations, the Minimum Distance Moved (MDM) for one male was 115 km per day, whereas in females it was 42 km per day (Fig. 2). Despite significant variations in the MDM between females, it was shorter than the MDM in the male. Due to



a small sample size, no statistical test was possible.
Fig. 2. Minimum Distance Moved in adults. Data for all periods of observations. Columns - MDM, km, vertical bars are standard deviation.

The duration of hunting sorties was not statistically different between the sexes and was 58±27.1 min in males and 49±30.7 min in females. Hunting sorties were most commonly a duration of 35-60 min, however once or twice a day the duration of the sortie was twice as much (c. 120 min.) This resulted in distortion of hunting sortie distribution which becomes skewed; the latter is especially visible in females.

Home range size.
The home ranges of the radiotracked falcons showed a significant (70-98%) overlap between each other. None of the home ranges for females extended beyond the mountain massifs, whereas the male also roamed in the open steppe. The minimum convex polygon for the male was 214.7 km^2 and fluctuated from 78.2 to 103.9 km^2 in four observed females. However the birds did not use this area every day. In a day the male covered on average 59.5±20.7 km^2 (i.e. 27.7% of home range), and females from 13±9.27 to 27±12.9 km^2 (from 16.9-28.7% of the home range). Normally the daily polygons showed a considerable overlap, however the latter is much smaller than the overlaps



between the neighbours.
Fig. 3. Daily MCP and total MCP for all periods of observations.

Fledged chicks demonstrated significantly smaller home ranges. Their home ranges varied from 3.1 to 25.5 km^2. Minimum distance moved varied between 0.2 to 2.1 km. Within 3 weeks after fledging all home ranges of chicks remained within the home ranges of parents. The chicks remained in the region of the nest at least until August.

Acknowledgements
This work is part of the Saker Falcon Conservation in Mongolia run by the Environmental Protection Agency, Ministry of Nature and Environment of Mongolia and National Avian Research Centre, UAE. We thank staff and administration of the EPA, and particularly Mr. S. Banzragch and D. Shijirmaa for their tremendous support during the field work. We are also grateful for the support of Dr. Sumya, the Dean of the Faculty of Biology for his understanding and help. The work would not be successful without enthusiastic help from Dundgov aimaq authorities and local herdsmen. Many thanks to O. Totubalina (Scott Polar) for help in image processing.

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Veterinary aspects of a falcon release project

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Abu Dhabi
United Arab Emirates

Introduction
Falconry is an integral part of the Arabian heritage. Falcons, mainly Sakers (*Falco cherrug*) and Peregrines (*Falco peregrinus*), were trapped to hunt prey to provide food for the falconer. After the hunting season the birds were released to save the falconer time, effort and the expense of feeding the falcon during the summer (1). This tradition continues in the form of the Sheikh Zayed Falcon Release Project, which is scientifically organised to learn as much as possible from the release. Healthy and well-trained falcons are most likely to survive release back to the wild (2,3). To ensure that all the release candidates have a perfect health status it is very important that a detailed pre-release health check is conducted for each bird. During the past four years, 215 Sakers and 90 Peregrines have been released back to the wild. This program is organized under the aegis of the Environmental Research and Wildlife Development Agency (ERWDA) and the Environment and Wildlife Management (EWM) as part of the Private Department of H.H. Sheikh Zayed bin Sultan Al Nahyan. The veterinary supervision is conducted by the Abu Dhabi Falcon Research Hospital as part of EWM.

Falcon Identification
Each bird is identified by species, age, sex, and coloration. Morphometric measurements of wing and leg are made. The falconer knows the source of the bird. This information is very important to make sure that no foreign genetic material is introduced to the wild population in the release area. A medical record file including a photograph is prepared for each falcon. A passive induced transponder (PIT) is implanted under the first muscle layer lateral to the sternum at the anterior 1/3rd of the pectoral muscle to provide permanent identification. The microchip number is recorded and each bird has a band fitted on the right leg displaying a unique number and the address of the organisation.

Veterinary Health Screening
Physical examinations are conducted thrice prior to the release, at 10 to 15 day intervals. The physical check includes:

a) The weight is taken to check if the bird is underweight in relation to the pectoral muscle mass and breed specification. A reduced and soft pectoral muscle mass combined with a protruding sternum and weight loss indicates poor health. The most common reasons for this are hunting activity, starvation, malnutrition, heavy parasite load or any other chronic clinical condition (4). The bird is brought to the optimum weight after appropriate treatments.

b) The mouth of the bird is examined for stomatitis due to *Candida* spp. or *Trichomonas gallinae*. Ulcers, or lesions caused by *Capillaria* spp. are also possible.

c) Eyes, Nostrils and Ears. The eyes are checked for corneal opacity, ulcers and bacterial or fungal conjunctivitis. Pox infection can also cause eyelid problems. When necessary, conjunctival swabs are taken for laboratory examination.
Nostrils are examined for external injuries, pox infection and blockage. Any blockage of the nostrils with sand or mucous is cleaned by flushing the nose with mild antiseptic solution (Optrex ®, Optrex Ltd., England). Choanal swabs are collected from all the birds for screening of *Chlamydia psittaci* antigen.
Ears are checked for any abnormal discharge.

d) The sternum is checked for injury. Lacerations are repaired under 3% isoflurane in oxygen with simple interrupted 5/0 Prolene sutures. Aseptic conditions are maintained. Sutures are removed in 12 days and these birds normally remain in the release project.

e) Stress Test: Every bird is subjected to a stress test where the bird hangs for 15 seconds on its jesses and leash. The recovery time and rate and depth of respiration are closely noted. A fat or unfit bird may have a longer recovery time and exhibit panting or laboured breathing. Usually a prolonged recovery time with prominent abdominal and thoracic thrust (double pump) indicates a respiratory problem such as pneumonia, aspergillosis or a heavy burden of *Serratospicula amaculata* and an endoscopic examination should be performed.

f) Feet are very closely examined for pox, bumblefoot, injuries or overgrown talons.

g) Feathers are inspected for the presence of ectoparasites. Primary flight feathers are examined and any broken ones are repaired.

h) The beak and talons are trimmed and sharpened.

i) Fecal examination. In the wild, falcons harbour endoparasites without showing clinical signs. When the birds are in captivity they become accustomed to a different environment. Re-release to the wild subjects them to stress and then even the presence of a few parasites can cause clinical signs (5). During the hunting season the birds have contact with other falcons from different countries. They might carry parasites that are not present in the release area and the risk of spreading these parasites should be minimised. To ensure that all the released birds are free of endoparasites a periodic fecal check is conducted along with every physical examination. The methods commonly used are direct mount, flotation and sedimentation.

Vaccination
All falcons are vaccinated against Newcastle Disease twice with a 21 day interval. A mixture of two inactivated Paramyxovirus vaccines is used at a total dose of 0.3ml / bird given subcutaneously. The vaccines used are Talovac 105-2 ND forte (3 parts) manufactured by Lohmann Animal Health GmbH & Co. KG, Germany, mixed with Chevivac (7 parts) manufactured by Chevita GmbH, Germany.

X-ray and / or endoscopy are performed when indicated by results of physical examination.

Radiology
In routine cases, falcons are X-rayed without anesthesia. Two assistants position the bird on its back with the wing and limbs extended for the ventro-dorsal view. A latero-lateral view is also obtained with extremities in extension. The positioning may vary depending on the site of interest. A 450-mA portable neonatal X-ray machine and automatic film processor are used.

Endoscopy
Endoscopy is performed under gas anesthesia. Induction with 3 % isoflurane in oxygen is followed by maintenance at 1.5 %. The endoscopy follows techniques described for avian species (6).

Blood Samples
Blood samples are collected for hematology and biochemistry.

a) Hematological tests: One ml of blood is collected from the *Vena metatarsea medialis* in a Calcium EDTA tube for hematology. PCV, hemoglobin, red cell, total leukocyte and differential leukocyte counts are performed routinely. Screening for blood parasites is also performed.

b) Blood chemistry estimation: One ml of blood is collected in a sodium-heparin tube. The routine blood parameters are aspartate aminotransferase, alanine aminotransferase, lactate dehydrogenase, alkaline phosphatase, total protein, albumin, total bilirubin, creatinine, sodium, potassium, chloride, uric acid, and urea.

Genetic study
Blood samples are taken to study the genetic diversity of falcons of different subspecies.

Satellite Telemetry
The falcon is anesthetised under isoflurane as previously described and a satellite transmitter is fitted on the back. Satellite telemetry makes the worldwide location of birds possible over an extended period. Sakers are fitted with a 30g battery and Peregrines with a 20g battery.

Isolation
Birds finally selected for release are maintained in isolation facilities for at least one month prior to release. All the falcons are given extensive training.

Transportation
The mode of bird transportation depends on behavioral screening results. Usually, they are transported to the release site hooded and perched on a padded carrier or in a ventilated and darkened carton. The bottom of

the carton is covered with plastic grass carpet with a sponge perch fixed to the center of the box. Plastic water spray pumps are used for cooling, soaking and to provide drinking water during transport.

Release Phase
On the release day the birds are once again assessed for any signs of transportation stress or damage to feathers. All birds are fed a full crop early in the morning on release day.

Conclusion
The procedures mentioned in the text help to select only healthy birds for release. By following a detailed veterinary health screening protocol the chances of survival should increase. Recapture of healthy falcons suggests that wild-caught birds used for falconry are able to resume life in the wild after the hunting season.

Acknowledgements
The author would like to thank H.H. Sheikh Zayed Bin Sultan Al Nahyan, President of the United Arab Emirates, H.H. Sheikh Tahnoon Bin Zayed Al Nahyan, Chairman of the Private Department, H.H. Sheikh Hamdan bin Zayed Al Nahyan, Deputy Chairman of ERWDA and Minister of Foreign Affairs, Abdullah Matar Bani Malek, Director Environment and Wildlife Management, Mohammed Al Bowardi, Director of Environmental Research and Wildlife Development Agency for the great support they extended to this project. The author also thanks Dr. Martin Wyness, British Veterinary Centre Abu Dhabi, for proof reading the manuscript.

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In reply to: Mummy - its use in falconry and veterinary practice. FALCO Issue 14, page 9.

Jaime Samour
Fahad bin Sultan Falcon Centre
Riyadh.

"I have a small comment related to 'mummy'. I have known this substance since my earlier days in Bahrain. The father of one of my assistants was a walking encyclopaedia on traditional Arab medicine and he introduced me to 'mummy'. In Bahrain as well as other countries in the Gulf, the substance is more commonly known as 'mommian'. The information given in the article is correct. 'Mommian' is a substance produced by a type of bee which lives mainly amongst rocks, but they can also nest in the mountains in the small cracks of trees. The bees are certainly small (8mm), dark and with a robust body. They are not aggressive and do not sting. 'Mommian' has the consistency of hard paste when it is fresh and it has a strong, sweet taste, almost like molasses. I have seen with my own eyes the nests of the bees and have tasted 'mommian' when fresh and the taste is very pleasant. The substance tends to trickle from the rocks and the name 'golden tear' is absolutely correct, since it shines a golden colour in the sunlight. 'Mommian' is not only found in Asia. The one on sale in markets throughout the Middle East comes mainly from Morocco. I have seen 'mommian' in its natural state not only in Morocco and Saudi Arabia but also in the Americas. The applications described in the article are all correct. In the Middle East 'mommian' is used mainly for its healing properties but especially during over exertion, fatigue, for bone fractures and muskuloskeletal trauma."

Falcon sales in Qatar

Mr Abdullah Al Naser
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Qatar.

In the early 1950's the season for falcon sales usually began at the end of September or early October. Large, good quality Sakers and Peregrines tended to migrate later to the countries of the Middle East and so they arrive in the Qatar markets in October. During the 1950's and 60's Qatari falconers bought falcons which had been trapped in countries across from the Gulf States. Falcons were trapped along the Iranian coast, Iraq, Syria and Jordan and these were used in addition to falcons which were trapped in the Gulf States. The islands in the Gulf were considered particularly attractive areas for trapping Peregrines.

At that time, countries such as Egypt and Pakistan were not aware of the importance and use of falcons in the Gulf States. No falcons were trapped and brought from these countries and trade was limited to those falcons trapped locally or from Iran and Iraq. More recently there has been an increase in the number of people keeping falcons in the region and this has resulted in a larger number of falcons being brought to Qatar from outside the region and a corresponding price increase in the markets. Dealers were quick to realise the potential for trade in falcons and resulted in trade routes extending to China, Asia and the Russian States.

Nowadays falcons are already arriving in the markets in mid-August. They arrive from Sudan, Yemen and the western coast of Saudi Arabia. Most of the falcons brought from these countries are Barbary falcons and not suited to Arab falconry. However, because there are no laws prohibiting the entry of such birds, large numbers are still transported to Qatar in an attempt to make whatever profit can be gained. Qatar has a long selling season and falcons can be found in the markets and the houses of falcon dealers from mid-August to the end of March each year.

Many kinds of falcons are brought to Qatar from regions already mentioned. In addition, captive-bred falcons from the U.S.A., Canada and Europe are also available. Prices vary each year depending on species and quality of the falcons, supply and demand, time of year and the prevailing economic situation.

This is a brief description of falcon markets in Qatar. It is estimated that the number of falcons brought to Qatar every season exceeds 1800. Similar numbers might also be sold in Saudi Arabia, Kuwait and Bahrain and probably twice as many falcons are sold in the United Arab Emirates. It is planned to introduce suitable methods of control and legislation to regulate trade in Qatar in an attempt to reduce the number of falcons being taken from the wild.

3rd Eurasian Conference of Raptor Research Foundation, Mikulov, Czech Republic, 21-26 September 1999.

The conference was held in the small town of Mikulov in Moravia at the Czech-Austrian border surrounded with grape plantations, fields and forest patches. The famous Moravian Madonna, a sculpture from pre-historic times was excavated from the area close to Mikulov. Undulating landscape, historic town centre and friendly social surrounding made the conference easy going. No visa requirements for western and former Eastern block countries resulted in a truly international conference. The keynote plenary paper "The post-DDT recovery of the Peregrine Falcon (*Falco peregrinus*) in North America" delivered by Dr. Lloyd Kiff of the Peregrine Fund set the standard for the conference papers. There were oral presentations from North-East Siberia to Europe and North America, as well as central, western and southern Europe and the Middle East. There were few delegates from Asia. In my opinion the most significant papers were those which dealt with the long-term collection and analysis of data such as the study of Peregrines in North America presented by L. Kiff, Snake River birds of prey by M. Kochert and Steller's Sea Eagle presented by M. McGrady and I. Utekhina. Interesting general biology papers which could contribute to the understanding of parasite-host systems were delivered by D. Lacina -Ectoparasites *Carnus hemapterus* influence the mass growth of nestlings of European Kestrel (*Falco tinnunculus*) and J. Votypka and co-authors - Blood parasites of raptors and their vectors in the Czech Republic.

The National Avian Research Center presented a paper on home ranges of Saker falcons in Mongolia and a poster of the diet of Sakers in Mongolia. Other papers dealing with Saker Falcons include a paper on population modelling and conservation through sustainable use by R. Kenward and co-authors . In the paper it is estimated that Saker Falcon populations could sustain residual yields of 16-26% of young, but very few adults.

The conference was well organised by the hosts, the Working Group on Protection and Research of Birds of Prey and Owls of the Czech Society for Ornithology. The abstracts were printed in a supplement to the Journal of the Working Group *Buteo* and were available for the delegates upon arrival. The meeting was sponsored by the Trebon Basin and Palava Landscape Area and Biosphere reserve Administration, Trebon, Moravia, Institute of Vertebrate Zoology of Czech Academy of Sciences, Brno and Mikulov Tourist authority.

Eugene Potapov

What's new in the literature ?

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

Alankari, A.R.S. (1998) Relationship Between Gonadal Steroids and Corticosterone During Blood Sampling in Saker Falcons. Journal of Wildlife Diseases 3: 653-655.
Blood sampling in manually restrained or ketamine (15 mg/kg given intramuscularly) treated Saker Falcons (*Falco cherrug*) induced an increased concentration in plasma corticosterone. Elevated plasma progesterone, oestradiol 17 beta, and testosterone concentrations also were observed in some of these birds. An inverse relationship was demonstrated between levels of corticosterone and progesterone, but not with the levels of other hormones. It is suggested that progesterone measurement should be taken into consideration when studying the influence of stressors in falcons.

Bailey, T.A. *et al.* (1998) Hunted by Falcons, Protected by Falconry - Can the Houbara Bustard (*Chlamydotis undulata macqueenii*) Fly into the 21st-Century. Journal of Avian Medicine and Surgery 3: 190-201.
This article examines the traditional relationship between the Houbara Bustard (*Chlamydotis undulata macqueenii*) and desert falconry in the Middle East and reviews factors causing the decline of houbara populations. Hunting with falcons, industrial development, changes to traditional agriculture, political instability, subsistence hunting, and wars are important factors combining to threaten this species throughout its range. Many initiatives to conserve the Houbara Bustard in the Middle East are supported by Arab falconers. The role of national wildlife conservation agencies in the Middle East in establishing captive breeding and restoration programs, habitat protection, ecological studies, biomedical research, local hunting organizations, falcon research groups, sustainable use in range countries, public awareness programs, rehabilitation projects, and international agreements to conserve the Houbara Bustard are described.

Dawson, R.D. & Bortolotti, G.R. (1997) Are Avian Hematocrits Indicative of Condition - American Kestrels as a Model. Journal of Wildlife Management 61(4): 1297-1306.
Diseased animals or those in poor condition are known to have reduced hematocrits. Many investigators have assumed that hematocrit levels thus reflect condition and disease status of an animal. This study tested these assumptions by examining the relation between hematocrits of American Kestrels (*Falco sparverius*) during several stages of the breeding season, and condition, prey abundance, and blood parasite load. We also examined the potential effects of a number of intrinsic and extrinsic influences on hematocrit. Hematocrits did not differ between the sexes, or between the pre-laying and incubation periods. Among females, hematocrit did not vary with the date of sampling, breeding chronology, prey abundance, condition, age, or moult, although hematocrit increased with ambient temperature during incubation. Hematocrit of males was not related to breeding chronology prey abundance, condition, age, or moult. During incubation, male hematocrit increased with the date of sampling and ambient temperature. Hematocrits of both sexes declined with the time of day that the sample was taken, and increased with the level of infection of the blood parasite *Haemoproteus*. The use of hematocrits to assess the health and condition of clinically normal kestrels is therefore questionable, and given the positive association with parasite loads, may even lead to erroneous conclusions

Ellis. D.H. (1999) Siblicide, splayed-toes-flight display and grappling in the Saker Falcon. J. Raptor Research 33(2): 164-167.
Here we report three types of novel aggressive behaviour for the Saker Falcon (*Falco cherrug*). The first concerns siblicide, never before directly witnessed for the genus *Falco.* The remainder concern aggressive behaviour of adults, including a new social display called splayed-toes-flight and observations of grappling and whirling.

Erdelyi, K. *et al.* Mycoplasmosis associated perosis type skeletal deformity in a Saker Falcon nestling in Hungary. Journal of Wildlife Diseases 35: 586-590.
A wild, 3-wk-old Saker Falcon (*Falco cherrug*) nestling showing uncoordinated movements and a perosis type tarsometatarsus deformity was found abandoned; it was euthanized a week later after an unsuccessful attempt to rehabilitate it. Gross pathological findings included congestion of parenchymal organs and a lateral bowing of the left tarsometatarsal bone. Histopathology revealed initial interstitial hepatitis, focal catarrhal pneumonia, and dyschondroplasia in the epiphysis of the left tarsometatarsus. Mycoplasmas were isolated from the lungs, trachea, bone marrow and brain. A polymerase chain reaction (PCR) assay was performed for the detection of the mycoplasmal 16S rRNA gene. The resulting 262 base pair PCR product was sequenced and compared to the available mycoplasmal sequences but no identical corresponding sequences were found. However, 98% similarity was found to the *Mycoplasma buteonis* 16S rRNA and the isolate also was positive by immunoblotting against reference sera to the same species.

Forbes, N.A. & Simpson, G.N. (1997) A Review of Viruses Affecting Raptors. Veterinary Record 141: 123-126.
Outbreaks of viral diseases have been diagnosed more commonly in raptors in recent years. The practice of feeding carnivorous birds with food derived from other birds exposes them directly to a wide range of potential pathogens. Some viruses which are avirulent in their

natural host are known to be more pathogenic when they cross the species barrier. Compromised immunity due to stress or inbreeding may further increase the disease risk. Traditional feeding methods may need to be re-appraised and changed in view of this risk. This paper reviews the literature on viral diseases of raptors and provides additional clinicopathological observations from unpublished cases.

Hakkarainen, H. *et al.* (1998) Blood Parasites and Nest Defense Behavior of Tengmalms Owls. Oecologia 114: 574-577.
Infectious diseases are expected to negatively influence essential life history traits of an individual because investment in immunological response occurs at the expense of reduced investment in other functions. Here we present the first observational evidence that the prevalence of blood parasites is negatively associated with avian nest defense. Because the defense of offspring entails a risk of serious physical harm to the parent, it is also assumed to be a good estimate of parental investment. In both 1994 and 1995, the nest defense intensity of male Tengmalm's owls (*Aegolius funereus*) against a live American mink (*Mustela vison*) was strongly curtailed in parents infected by *Trypanosoma avium* blood parasites. Our data suggests that investment in reproduction can be negatively affected by parasitaemia, and that host-parasite interactions may potentially modify hosts' life-history traits, making it important to consider the costs of parasitism in future studies.

Johne, R. and Muller, H. (1998) Avian Polyomavirus in Wild Birds - Genome Analysis of Isolates from Falconiformes and Psittaciformes. Archives of Virology 143(8): 1501-1512.
Avian polyomavirus (APV) infections have been reported to cause fatal disease in a wide range of psittacine species. Here we demonstrate APV infections in buzzards (*Buteo buteo*) and in a falcon (*Falco tinnunculus*) found dead in Germany, and in lovebirds (*Agapornis pullaria*) with fatal disease, wild-caught in Mocambique. The genomes of the isolates obtained from the falcon and one of the lovebirds proved to be very closely related to those of Budgerigar Fledgling Disease Virus (BFDV)-1, BFDV-2 and BFDV-3, isolated from budgerigar, chicken, and parakeet, respectively. Data presented in this investigation show that the polyomavirus isolates obtained from different avian species so far all belong to one genotype and one serotype within the proposed subgenus Avipolyomavirus of the family Papovaviridae. The designation Budgerigar Fledgling Disease Virus (BFDV) is, therefore, misleading as this virus type infects different species of birds.

Lierz, M. *et al.* (1998) Blood Chemistry Values in Wild Raptors and Their Changes After Liver Biopsy. Berliner und Münchener Tierärztliche Wochenschrift. 7-8: 295-301.
The present paper tried to find relations between specific anamnesis of wild raptors and blood chemistry values at their day of presentation. 60 (88%) out of 68 presented birds of prey showed changes in their blood values. In most birds an increase of GOT, GPT and AP was seen. Some birds showed increases of uric acid, urea and changes in the proportion of Ca and P as well. A comparison between Eurasian buzzards with fractures and some without clinical signs showed a significant increase of uric acid, urea, potassium and anorganic phosphorus in the group of fractured birds. Changes in blood chemistry values after liver biopsy are investigated in the second part of the present study. Liver and kidney values showed an increase after the biopsy. Kestrels (*Falco tinnunculus*) showed a maximum increase on the first day after biopsy while Eurasian buzzards (*Buteo buteo*) had the maximum on the third day and Black kites (*Milvus migrans*) on the fifth day after biopsy.

Lumeij, J.T. *et al.* (1998) Plasma Chemistry in Peregrine Falcons (*Falco peregrinus*) - Reference Values and Physiological Variations of Importance for Interpretation. Avian Pathology 27(2): 129-132.
Reference values (inner limits of the percentiles P-2.5 and P-97.5 are given with a probability of 95%) for 21 plasma chemical variables were established in 79 Peregrine Falcons (*Falco peregrinus*). The following values were established: urea 0.8 to 3.9 mmol/l, creatinine 24 to 64 mu mol/l, glucose 16.5 to 22.0 mmol/l, sodium 150 to 170 mmol/l, chloride 114 to 131 mmol/l, inorganic phosphorus 0.55 to 1.53 mmol/l, osmolality 322 to 356 mOsmol/kg, alkaline phosphatase 31 to 121 IU/l, alanine aminotransferase 29 to 90 IU/l, aspartate aminotransferase 34 to 116 U/l, gamma glutamyl transferase 0 to 3 IU/l, lactate dehydrogenase 1008 to 2650 IU/l, creatine kinase 120 to 442 IU/l, cholinesterase 143 to 325 IU/l, glutamate dehydrogenase < 8 IU/l, total bile acids 5 to 69 mu mol/l, uric acid 253 to 995 mu mol/l, total protein 24 to 39 g/l, albumin 12.7 to 22.4 g/l. Reference values for the calculated albumin/globulin (A/G) ratio were 0.8 to 24. Based on previous studies, reference values for calcium were established using an adjustment formula using plasma total protein concentrations (before correction 1.86 to 2.49, after correction 1.97 to 2.46 mmol/l). Results of plasma potassium concentrations were erratic which was shown to be due to a time lag between sample collection and separation of plasma and cells.

Pozio, C. *et al.* (1999) *Trichinella pseudospiralis* in sedentary nocturnal birds of prey from central Italy. Journal of Parasitology 85(4): 759-761.
Trichinella pseudospiralis has been isolated from carnivorous and carrion-feeding mammals and birds in Eastern Europe, Asia, Australia, and North America, suggesting its cosmopolitan distribution. We conducted a survey to detect this parasite in raptorial and carrion-feeding birds in Italy, examining muscles from 205 animals. We isolated from the breast muscle 1 larva from a Tawny Owl (*Strix aluco*) and 2 larvae from a Little Owl (*Athene noctua*). These larvae were identified as *T. pseudospiralis* by the polymerase chain reaction with a specific primer set. This is the first documented report of *T. pseudospiralis* in animals in Western Europe.

Samour, J.H. *et al.* (1996) Normal Hematology of Captive Saker Falcons (*Falco cherrug*). Comparative Haematology International 6: 50-52.

A complete haematological study was carried out on 25 clinically normal captive female Saker Falcons (*Falco cherrug*) in order to establish normal haematology reference values for the species. The results are compared with values obtained in captive Peregrine Falcons.

Wernery, U. *et al.* (1998) Salmonellosis in relation to chlamydiosis and pox and Salmonella infections in captive falcons in the United Arab Emirates. Journal of Veterinary Medicine Series B Infectious Diseases and Veterinary Public Health 577-583.
During the spring of 1995, 1996 and 1997 following tests on six Peregrine Falcons (*Falco peregrinus*) and two Gyr Falcons (*Falco rusticolus*), *Salmonella typhimurium* was isolated from liver, spleen and small intestines. Four of the falcons (two Peregrines and two Gyrs) had also contracted *Chlamydia* infection, three Peregrines a pox infection and one Peregrine a Herpesvirus infection. It is believed that this dual infection was fatal for these birds. The disease was marked by anorexia, dehydration and green-coloured droppings. Necropsy of all falcons revealed discolouration of the liver and enlargement of liver and spleen. Miliary necrosis was detected in all livers. A total of 12 salmonella serovars, including. *S. typhimurium*, were cultured from faeces of 48 falcons which showed no clinical signs.

PIT Recoveries

Below is a list of microchips for which some of the falcons have been reported but the place implanted is unknown. Please would veterinarians check the list and fill in any of the missing data (*****). If you do have information, please send it to the microchip co-ordinator at the editorial address.

Microchip number	Date detected	Place detected	Species	Sex	Age	Place implanted	Date implanted
111149596A	8/98	Almaty Zoo	Saker	F	Adult	Turaygyr	6/11/94
011832096	2/2/99	FSFC, Riyadh	Saker	F	Adult	******	******
015050032	28/11/98	FSFC, Riyadh	Saker	F	Adult	Kazakstan	1997
007281789	3/99	FSFC, Riyadh	Saker	F	Adult	Dubai	11/93
021578548	1999	FSFC, Riyadh	Saker	F	Adult	Dubai	11/97
015317568	3/99	FSFC, Riyadh	Saker	F	Adult	Dubai	9/95
020812567	17/2/99	FSFC, Riyadh	Saker	F	Adult	Dubai	11/97
005827778	25/1/99	FSFC, Riyadh	Saker	F	Adult	Abu Dhabi	1/12/98
005108280	2/99	FSFC, Riyadh	Saker	F	Adult	Dubai	1/15/94
001827359	17/12/98	FSFC, Riyadh	Peregrine	F	Adult	Abu Dhabi	10/93
001360842	15/2/99	FSFC, Riyadh	Peregrine	F	Adult	Abu Dhabi	10/93
014092339	11/5/99	FSFC, Riyadh	Peregrine	F	Adult	Dubai	12/95
015308553	3/3/99	FSFC, Riyadh	Peregrine	F	Adult	Dubai	1996
121775762A	9/99	FSFC,Riyadh	Peregrine	F	Adult	******	******
012089043	9/99	FSFC,Riyadh	Saker	F	Adult	Dubai	10/31/95
000084333	9/99	FSFC,Riyadh	Saker	F	Adult	Dubai	12/21/91
024864545	9/99	FSFC,Riyadh	Saker	F	Adult	******	******
006365372	12/10/99	FSFC,Riyadh	Saker	F	Adult	Dubai	6/94
024783049	14/10/99	FSFC,Riyadh	Saker	F	Adult	******	******
014789617	19/10/99	FSFC,Riyadh	Saker	F	Adult	******	******
017567032	19/10/99	FSFC,Riyadh	Saker	F	Adult	******	******
007000345	20/10/99	FSFC,Riyadh	Saker	F	Adult	******	******
017575028	20/10/99	FSFC,Riyadh	Saker	F	Adult	******	******
125472726A	26/10/99	FSFC,Riyadh	Saker	F	*****	******	******
022063621	31/10/99	FSFC,Riyadh	Saker	F	Adult	******	******
016308823	31/10/99	FSFC,Riyadh	Saker	F	Adult	******	******
0A00086127	3/11/99	FSFC,Riyadh	Saker	F	Adult	******	******
023573862	3/11/99	FSFC,Riyadh	Peregrine	F	Adult	******	******
025618842	23/11/99	FSFC,Riyadh	Saker	F	Adult	******	******
122119116A	7/12/99	FSFC,Riyadh	Saker	F	Adult	******	******