AL WABRA WILDLIFE PRESERVATION, QATAR: WORKING WITH TURACOS Musophagidae spp.

by Simon Bruslund Jensen

The turacos are a primitive, almost primeval-looking family of medium to large-sized birds, most closely related to the cuckoos. The 23 species are distributed exclusively in tropical African forests and savannahs. Most species are beautifully coloured in shades of green, blue and red, and are well known for their unique feather pigments, the so-called turacin and turacoverin, found only in this family.

Sven Hammer/AWWP

A Prince Ruspoli's Turaco *Tauraco ruspolii* approaching a waterhole close to Arero, Ethiopia.

Due to their appealing appearance, many of the species have for many years been popular in zoos and private collections. However, just a few years back, captive breeding would never have been considered as an option for the conservation management of turacos, as they had long been considered as delicate and rather difficult to breed in captivity.

In recent years the methods used for keeping and breeding turacos have improved a great deal, due largely to the systematic approach by dedicated individuals and public collections such as the zoos in Cologne, Germany and Houston, Texas, USA. Now for the first time, it seems possible to establish self-sustainable captive populations, in particular within the

framework of regional and international cooperation, with studbooks being maintained to ensure the necessary exchange of bloodlines.

This is in line with the identification of more and more threats to several turaco species in the wild, especially to some of the unique subspecies with limited distribution. Al Wabra Wildlife Preservation (AWWP), owned by Sheikh Saoud Bin Mohammad Bin Ali Al-Thani, has had a long standing interest in improving our knowledge of some of the lesser known species and subspecies, and has decided to invest resources into the turacos as a group, with initial emphasis on two species, one *in situ* and the other *ex situ*.

The goals of AWWP were to investigate the current status of the little known Prince Ruspoli's Turaco *Tauraco ruspolii* in Ethiopia and simultaneously develop captive management strategies for turacos using a common species, the Violet Turaco *Musophaga violacea* of West Africa, as a model.

Prince Ruspoli's Turaco (*in situ*)

AWWP has coordinated and funded research on Prince Ruspoli's in Ethiopia, which has resulted in major publications on the ecology of its habitat, the juniper forests, and some of the problems this species faces in the wild.

Prince Ruspoli's Turaco, which has a very limited distribution in south-central Ethiopia, remains one of the least known of the turacos. It appears that it is strongly connected with the endemic juniper forest found in this region. For a long time the limits of its distribution remained undefined, as did its ability to adapt to other types of habitat. It was believed that the juniper forests were subject to a number of threats, including from large numbers of feral goats, along with humans cutting down trees for much needed firewood. Furthermore, there had been sightings of possible hybrids between Prince Ruspoli's Turaco and the more common White-cheeked species *T. leucotis*, that normally occurs further north in Ethiopia, isolated from the juniper forests.

In 2003 AWWP employed Italian biologist Luca Borghesio to answer some of these questions and if possible investigate what could be done to secure the future of Prince Ruspoli's Turaco and its habitat. He put together a research team in order to undertake an expedition to Ethiopia, in cooperation with the Ethiopian Wildlife Natural History Society and the Ethiopian Wildlife Conservation Organisation.

One of Borghesio's first tasks was to identify the extent of the juniper forests and the decline that had occurred in the past decades. This was done with the help of satellite images taken by the US military. Images covering the entire region were purchased and after visiting the forest the specific signatory structure of the undisturbed juniper forest was compared to that

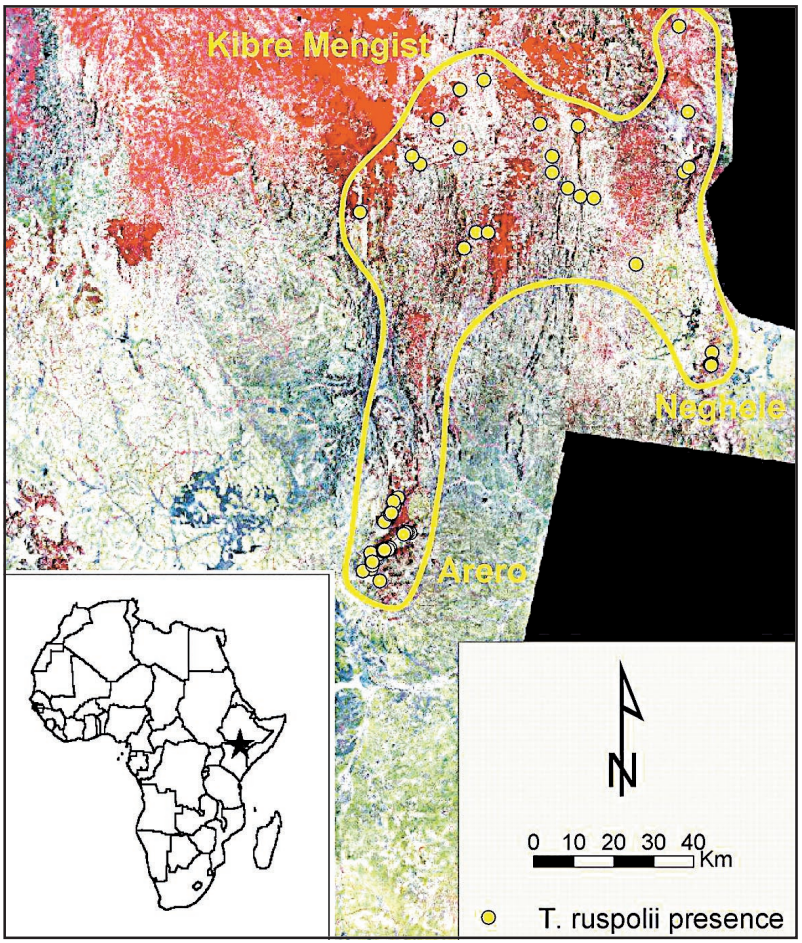
of destroyed forest, as well as that of other types of forest cover. This data was then correlated to their specific coordinates on the satellite maps. The process revealed an exact picture of the juniper forests in the entire region, as well as giving clues to their status. The field expeditions also wanted to determine if the turacos did in fact occur only in specific habitats. Results were a little inconclusive, as the field work was cut short by Ethiopian bureaucracy and our research permit being revoked. However, it was possible to determine that Prince Ruspoli's Turaco was present also on the fringes of its preferred habitat. In addition, it was proved that hybrids between Prince Ruspoli's Turaco and the White-cheeked species exist where the two meet. Based on historical data on the distribution of the White-cheeked Turaco and the fact that so far only a few hybrids have been observed, it is fairly certain that this is a recent development.

Our studies proved that the density of Prince Ruspoli's Turaco was larger than expected, especially in suitable habitat, but also that this habitat is shrinking at an alarming rate. The massive loss of habitat may be what causes Prince Ruspoli's Turaco to move into other habitat, where it comes into contact with the White-cheeked species, with the result that hybrids sometimes occur. Or, it may also be possible that the juniper forest is changing due to human activity causing deforestation. Another reason may be that the planting of non-native and taller trees is allowing the White-cheeked Turaco to encroach into traditional Prince Ruspoli's Turaco habitat. The long-term effects of hybridization are unknown and will need further studies.

Our studies provided conclusive evidence to validate a recommendation to the IUCN/BirdLife to re-evaluate the threat status of Prince Ruspoli's Turaco and to consider elevating it from Vulnerable to Endangered status.

The field trips also gave us a better understanding of some of the humanitarian problems in the region. The lack of firewood is a major problem for the local people, as is the lack of surface water, which makes it difficult to cultivate the same areas of cleared land over a number of years. Amongst the local people there is little understanding of the uniqueness of their forests, therefore they cut down the trees indiscriminately and replant with introduced species, leaving little space and food for the endemic fauna. The feral goats remain uncontrolled and destroy forest even in isolated places. In particular, they apparently damage the ground by impacting the soil, making it difficult for juniper trees to grow. Large scale erosion is evident in places where the forest has been cleared.

The only way it will be possible to counter some of these problems, will be to help the local people to develop the region and make better use of available resources and at the same time improve their appreciation of their unique forests. It may be possible to make better use of the farmland by



LANDSAT satellite image of survey area January 2002. Yellow spots indicate the known presence of Prince Ruspoli's Turaco and the yellow line bounds its estimated range. Forested areas are coloured red and *Acacia-Combretum-Terminalia* woodland blue-green. Transitional habitats between forest and woodland are selected by this turaco.

pumping up underground water and by controlling the goats. More effective ways of burning wood can also be introduced. There is, for example, a simple metal stove that compared to the traditional open fireplace, reduces by half the amount of wood needed to boil water.

North-eastern Africa, including large parts of Ethiopia, seem to be inescapably affected by global climate change, that is directly influenced by humans. In few regions of the world are the direct effects as visible as here,

Remnant forest near Negele, on the southern edge of its range. Mankubsa Forest has been destroyed in less than 15 years and the presence of Prince Ruspoli's Turaco in the area is severely threatened. It was still observed there in February 2003 in isolated groves of trees which had been spared deforestation.

with ongoing droughts and failing rains, as well as increasing temperatures. How this is affecting the region in which Prince Ruspoli's Turaco lives is unknown, but it is certainly an additional factor that warrants ongoing monitoring (Flannery, 2005).

Violet Turaco (*ex situ*)

AWWP is using the Violet Turaco as a model species to identify the needs of turacos in captivity and to learn how they respond to the conditions available. With this information we can then continuously develop better captive management guidelines and determine if it is feasible to consider captive management and 'conservation breeding' for endangered species of turaco. The purpose of this is to develop self-sustainable captive populations to ensure the survival of endangered species such as Prince Ruspoli's Turaco, which is currently not being maintained in captivity. Should it become necessary, such populations could function as an invaluable back-up and a research resource.

The Violet Turaco is a typical bird of gallery forest, often found in the more lush growth of trees along rivers and creeks, as well as the margins of forests. Its general behaviour is similar to that of most other turaco species including, at least so we expect, Prince Ruspoli's Turaco. It feeds mainly on fruits especially figs and occasionally eats insects, having a particular liking for swarming termites.

Turacos are most frequently observed in pairs, but may occasionally be seen in small groups, especially around favoured feeding trees and water sources. At other times turacos are territorial birds that loudly proclaim their presence in their territory and perform visual displays that often involve their vividly coloured wings. Their nests, which are mostly fragile platforms of sticks often placed in thick foliage, are not unlike those of pigeons. Typically one to two eggs are laid and are incubated by both birds. The incubation period of the Violet Turaco is longer than that of most other species, being 24-26 days, rather than the usual 18-21 days. The young of all turacos leave the nest very early, at less than three weeks old and even before they can fly. They climb around in the nesting tree using both their claws and their wings to hold on. In the wild the Violet Turaco has been known to occasionally be assisted at the nest by helpers, thought to be young from previous clutches. Such behaviour has not been recorded among most of the other turacos.

The captive population of Violet Turacos at AWWP is based on two founder pairs. Between 2000-2005, 22 young were hatched of which 13 were parent-reared and nine were hand-reared. In total we had 12 mortalities of birds less than six months old, equally distributed between hand-reared and parent-reared birds.

The turacos have been kept in a number of different set-ups, leaving us with a fairly good idea of their optimal housing requirements. Violet Turacos are easily disturbed by other birds of different species when kept in a mixed species aviary and are particularly disturbed by others of their own species, even when kept in neighbouring aviaries. It is therefore advisable to keep breeding pairs secluded from other turacos and preferably some distance away to avoid stress caused by other turacos' loud territorial calls. Attempts to keep non-breeding birds in groups for any length of time have consistently failed, both in small aviaries and in very large free-flight aviaries, even in the case of relatively young birds. However, on one occasion an unrelated trio, consisting of one male and two females, lived together in the large free-flight aviary, with all three together attending and fiercely defending a nest. So far they have failed to rear any offspring, which may very well be related to the competition from other birds in the aviary. Normally attempts to keep more than two birds together result in aggression at some point, but two birds, even if they are the same sex, normally get on well together without any problems. For breeding, largish aviaries 8m long x 5m wide x 4m high (approx. 26ft long x 16ft wide x 13ft high), that are well-planted and provide plenty of hiding places and shade, have proved most successful. The nest baskets are placed high in the aviary and the birds are provided with artificial rain several times a day.

Adult Violet Turacos seem to adapt well to the climatic conditions in Qatar, both in the blazing heat of the summer when the temperature may reach up to 55°C (131°F) and in the winter when the night time temperature drops to 5°C (41°F). However, young birds, particularly nestlings, suffer in the heat and the eggs do not hatch when it becomes too hot, so an air-conditioned shelter is a big advantage.

The turacos are somewhat nervous in disposition and even tame, hand-reared birds, are easily flushed and frightened. This is particularly true of birds that are new to an aviary, and we have seen a few birds with injuries and even fatalities as the result of flying against the mesh. By using mesh that is flexible this risk is much reduced. Being careful and quiet around cages and aviaries with recently transferred birds is also important. Turacos are also nervous when being handled and holding them for too long, particularly in hot weather, should be avoided. Attention should also be paid to the fact that turacos are apt to struggle a lot when being held, and are loose feathered, making them difficult to hold on to.

Turacos can be tough on each other and on several occasions we have suspected aggression by the adult male towards fledglings. It can be an advantage to remove the young early if aggression is suspected. The fledglings can be placed in a neighbouring cage or in a small cage in the aviary, and the parents will often continue to feed the young through the

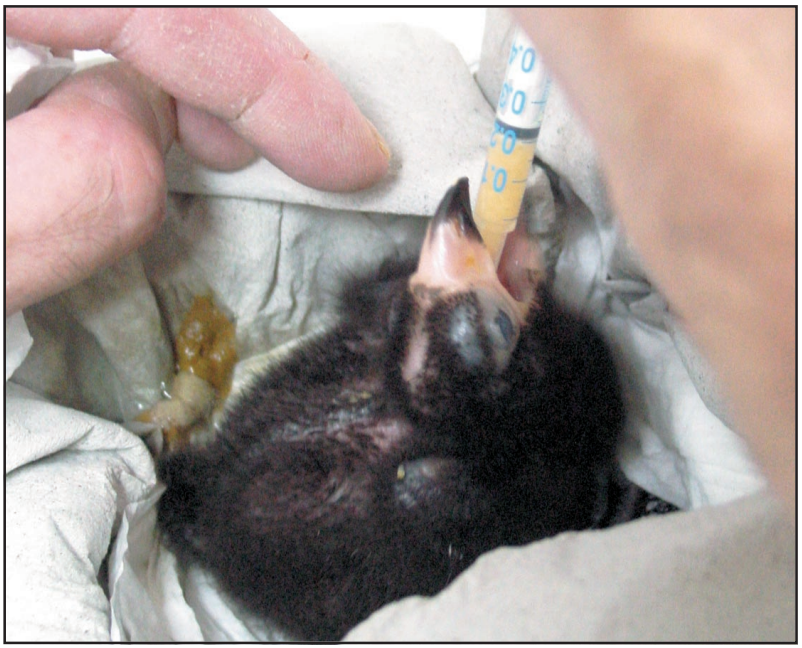
Luca Borghesio

Transitional habitat between *Juniperus-Podocarpus* forest and *Combretum-Terminalia* woodland just south of Kibre Mengist. Up to 10-20 Prince Ruspoli's Turacos can be seen in a day, but the habitat is changing rapidly, seemingly in favour of the White-cheeked species.

Catrin Hammer/AWWP

The largest holding facility for turacos at AWWP is 1,800 sq m (approx. 19,375 sq ft), but can only hold three turacos without aggression occurring sooner or later.

mesh. With many turaco species, males have been known to kill their mates, so care must be taken to provide plenty of potential hiding places, not just low down but also at the higher levels of the aviary. It may be worth mentioning that the courtship behaviour of turacos often includes a ritualized



Simon Bruslund Jensen/AWWP

Five days old Violet Turaco being fed using a syringe.

Simon Bruslund Jensen/AWWP

Adult pair of Violet Turacos calling in duet.

chase, that may become aggressive if the birds are confined in too small an aviary and if no hiding places are available. Sliding doors between adjacent aviaries is a good idea, as it provides the option of separating birds for short periods without causing too much disturbance; it is also useful when pairing up or flocking birds.

At AWWP the turacos' diet consists mainly of fresh fruits. Banana, pear and papaya (pawpaw) are fed daily, with apple, mango and grapes, as well as a number of local seasonal fruits, being added to the diet to provide variety. We also offer them greenfood in the form of parsley and occasionally dandelion leaves. In addition the birds are offered small amounts of a dried insectivore mix in the morning and Hill Mynah pellets (fed dry) in the afternoon. A few mealworms are normally given once or twice a week only, but can be offered a little more frequently when the birds are breeding. Turacos have a high metabolism and eat large amounts of food and it is important that the vast majority of their diet consists of fruit, of which they will consume more than 100g a day. Foods other than fruit must be restricted otherwise they may cause obesity and other health problems.

During breeding the birds are fed the same diet as usual, except that once chicks are in the nest, larger amounts of food are needed. It may be necessary to feed them several times a day to ensure that fresh food is always available. A breeding pair is very faithful to a successful nest site and will use it over and over again. The nest itself is a very simple collection of a few sticks and twigs and very little improvement is made to it between clutches. Some pairs do not use nest material at all, instead the female lays the eggs directly on the bottom of the nest basket provided. It is though important to provide such birds with some nest material to support the eggs and most importantly to give the chicks something to grip onto. Moving the nest or transferring the birds to another aviary may very well disrupt the entire breeding season. Pairs prefer to use nest baskets placed high in the aviary, preferably in a dark corner. It is important that fine branches are available close to the nest, as the chicks will leave the nest before they are able to fly and will possibly even climb back onto the nest; large branches seem to deter the parents from using the nest site. Most ordinary baskets will be accepted by the birds. We have found that a good size is about 20cm x 20cm (approx. 8in x 8in) and have the impression that baskets with high sides are preferred and birds using them are less sensitive to disturbance; they also prefer to be able to see through the bottom of the basket. Wooden frames 22cm x 22cm x 15cm high (approx. $8^1/_2$in x $8^1/_2$in x 6in high) with the bottom made of fine mesh are a good alternative. Violet Turacos are able to breed in their second year; one female at AWWP produced her first eggs when aged one year and five months old.

If eggs have to be removed for artificial incubation, a temperature of

Table 1. Diet sheet.

AWWP basis diet				Amount for one bird per day										
Time	**Items**	**Amount per bird**		Kcal	fibre g	sugar g	fat g	protein g	water g	Ca mg	P mg	VitA µg	VitD IU	Fe mg
am	Banana (sliced)	1/4	= 15g	13.2	0.4	3.1	0	0.2	11.4	0.9	3.0	0.4	0	0.05
	Pear (chopped)	1/3	= 15g	7.05	0.3	1.7	0	0.1	12.9	1.0	1.0	0	0	0.03
	Papaya (chopped)	1/2 slice	= 15g	4.8	0.1	1.2	0	0	13.7	3.6	0.7	6.0	0	0.02
	Other fruit	Few cubes	= 10g	6	0.2	1.0	0	0.1	8.0	1.1	1.3	1.5	0	0.03
	Witte Molen pellets	60 pieces	= 3g	2.4	0	0.1	0.2	2.5	0.3	30	24	36	240	0.21
	Aleckwa-insect	1/4 spoon	= 5g	8	0.9	0.3	1.1	0.9	0.5	-	-	50	50	0.65
	Nekton supplement	1/3 spoon	= 0.3g	-	0	-	-	-	-	0.03	0.02	327	2.4	0.93
pm	Banana, (sliced)	1/4	= 15g	13.2	0.4	3.1	0	0.2	11.4	0.9	3.0	0.4	0	0.05
	Papaya (chopped)	1/2 slice	= 15g	4.8	0.1	1.2	0	0.1	13.7	3.6	0.7	6.0	0	0.03
	Apple (chopped)	1/3	= 15g	7.35	0.4	1.8	0	0	12.6	1.0	1.0	0.3	0	0.02
	Greenfood	2 leaves	= 4g	0.44	0.1	-	0	-	3.4	0.3	0.4	4.8	0	0.03
	Zeigler pellets	50 pieces	= 4g	2.4	0.1	0.2	0.2	0.6	0.4	140	54	93.4	38.9	0.28
Total			116.3 g	69.6	3.0	13.7	1.5	4.7	88.3	182.4	89.1	526	331	2.33
Total %					2.6	11.8	1.3	4.1	76.1					

AWWP supplementary feeding / variation (preferably at am feed)	Amount for one bird per day						
Item	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Mealworms		2-3 whole				2-3 whole	
Greenfood	2 leaves	2 leaves	2 leaves	2 leaves		2 leaves	2 leaves
Orange			1/5 = 10g				1/5 = 10g
Grapes		1-2 = 10 g		1-2 = 10g		1-2 = 10g	
Seasonal fruit	10 g				10 g		
Nekton Tonic F	1/3 spoon			1/3 spoon			
Nekton S		1/3 spoon				1/3 spoon	
Nekton MSA			1/3 spoon				1/3 spoon

Seasonal fruits including mulberries, guava, canár, plums and figs or alternatively cucumbers or bell-fruits can be offered. **Greenfood** including mainly water-cabbage but also dandelion, spinach, parsley and lettuce is offered in pm feed.

Preparation of food dish: The papaya, banana, as well as soft pear, can be fed in slices or chopped. All hard fruits must be cut into cubes < 1cm². Grapes cut into halves. Aleckwa should be sprinkled over the fruits and pellets placed on the side. Vitamins are sprinkled over the preferred food items.

Simon Bruslund Jensen/AWWP

Immature Violet Turaco hand-reared at AWWP: note the position of the toes.

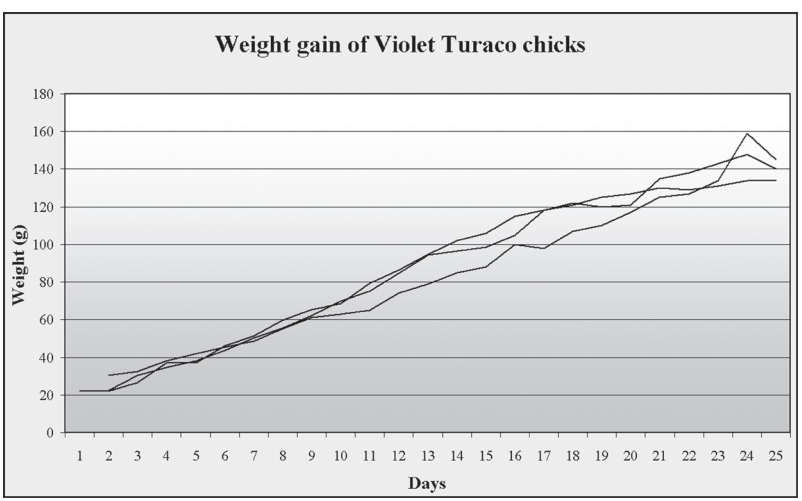
Simon Bruslund Jensen/AWWP

Adult Violet Turaco.

37.5°C-37.8°C (99.5°F-100°F) and a relative humidity of 45%-55% work quite well. The eggs have to be turned five to 12 times a day. Turaco eggs are pure white and very round almost entirely spherical in shape. We have often found them to be relatively fragile without being thin-shelled.

Freshly hatched Violet Turacos chicks are, like those of most turacos, covered with fluffy black down. They open their eyes on the first day and after a week the first pin-feathers emerge on the wings. Chicks being hand-reared are fed fruit pulp mixed with a commercial hand-rearing formula made for parrots, which can be administered through a syringe. Gradually more and more whole pieces of fruit and soaked pieces of Hill Mynah pellets are added to the diet and can be offered using forceps at the side. Small amounts of vitamins and minerals have to be added to the mix at all times to avoid any problems with bone development. Young chicks are fed every 1½ hours during a 14-hour day period but are not fed at night when they should be given the opportunity to rest. The feeding intervals are gradually increased to every three hours by about day 20. At this point the chicks can be offered some food in a small bowl placed in the brooder. It is an advantage to wean the chicks early to avoid them becoming imprinted on humans. Just after hatching, the temperature in the brooder should be about 37°C (98.6°F) and then gradually lowered to about 30°C (86°F) by about day 20. Hand-reared young turacos that have received minimum attention become good parents themselves whereas imprinted birds, when they are breeding, often become very aggressive towards humans.

Table 2. Average weight gain of three chicks from day one to day 26.



The average body weight of healthy male Violet Turacos kept at AWWP is approximately 340g (range 315g-360g) and the average body weight of females is 305g (range 277g-354g).

Products mentioned in the text

Aleckwa Honigfutter grob (insectivore food with honey): supplied by Aleckwa Tiernahrung, Germany (website:www.aleckwa.de).
Wittemolen Beo Care Plus Granulate (Hill Mynah pellets): supplied by Wittemolen, the Netherlands (website:www.wittemolen.com).
Zeig1er Bird of Paradise Pellet (low iron pellet): supplied by Zeigler Bros., Inc., USA (website:www.zeiglerfeed.com).
Nekton-Tonic F, -S and -MSA (supplements): supplied by Guenter Enderle, Nekton Produkte, Germany (website:www.nekton.de).

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Al Wabra Wildlife Preservation (AWWP) is a private institution owned by HE Sheikh Saoud Bin Mohammad Bin Ali Al-Thani. The breeding centre for rare and endangered wildlife, which has state of the art facilities, including climate control and artificial rainfall systems, is located in central Qatar, and appears literally as a lush green oasis in the middle of a stony desert.