

The Brno Zoo and rescuing the Asian turtles

Over the last few years, many scientists are trying to draw people's attention to a new phenomenon, commonly known as "the crisis of the Asian turtles". In the more and more overpopulated and industrialized south-east Asia, the human use of turtles has surpassed every limit of acceptability. It's not only about the poor villager's hunting for personal use. This kind of action is understandable and it doesn't pose a global danger. Today, the greatest danger for turtles is the huge business, focused on profit for opportunists that trade with exclusive food and pharmaceutical products. The turtle pickers earn quite a bit on the side and they stand on the beginning of the business machinery chain: that is, the yearly salary of a worker in Vietnam is about 200 dollars and the price that he gets from a trafficker for one turtle kilogram is between 1 to 2 dollars.

The bottomless Chinese market

Nowadays, turtle hunting is very efficient and the trade is highly organized. Individual natives search and collect the turtles with the help of trained dogs. They catch them into traps and nets, or by fishhooks; they dig them up from the mud, and so on. Then, the middlemen buy the turtles from



A male of the Malaysian giant turtle (*Orlitia borneensis*)

the natives and they secure the transport to the merchants, who sell them to the single sellers. The sellers then supply the restaurants and the markets. The turtles are transported by ships, trucks, and planes; the air transport is the most efficient one.

The turtle trade expanded mostly due to China, which opened its giant market for it. The high demands of the Chinese for luxurious food, which encourages preparations and medicaments made of turtles, can no longer be satisfied with local hunting or farm breeding and that is why hunting in more and more neighbouring countries are being organised. The biggest suppliers are the poor states bordering China, such as Vietnam, Laos, Myanmar (Burma). For example, 110 574 kg of turtles were imported to Hong Kong in 1991; the number has risen up to 680 582 kg in 1993 and it was 1 800 000 kg during the first 10 months of 1994. The import number was an unbelievable 3 500 000 two years later! 12 millions specimens is the estimated number of turtles sold mostly on



A head of the Malaysian giant turtle

the Chinese markets during one year. The scientists from the Netherlands, USA, Germany, Austria and other states have warned us for already several years that the Chinese, who already wiped out their own populations, are able to completely exterminate most of the turtle breeds of their neighbours and gradually will focus on wider surroundings, that is, Malaysia, Indonesia, India, Uzbekistan, or Kazakhstan. Chinese traders already plan to exploit South America as well.

The turtle trade is completely unselective and it includes all of the endangered species that are protected by either local or international laws. 74% of 98 Asian breeds of turtles are considered to be endangered, a lot of them belong to the critically endangered category. The way of the offer in the Chinese markets is very drastic: the turtles are prepared for cooking without being previously killed.

A confiscated load

In the last years, there has been foreign pressure on Chinese authorities to mind the control of the observance of the preservation conventions more consistently. The Chinese officially proclaim the willingness to impose sanctions on the illegal imports, but the practise is different: they occasionally try to take certain measures, but these actions are still just symbolical.

Among foreign pressure, there is also a deed of the Hong Kong Agriculture, Fisheries and Conservation Department and the local customs



Spiny turtle (*Hesemys spinosa*)



Typical necrotic changes on the plastron of the Malaysian giant turtle just after the import

offices (Customs Ship Search and Cargo Command), although at that time Hong Kong was already a special administrative part of China. The customs officers stopped a ship from Macao in the Hong Kong port on 11th December 2001. Aboard were almost 10,000 turtles of 12 species, all meant to be sold on Chinese markets for their meat. The market price was about 3,200,000 USD. The scientific price, as well as the ethical aspect of dealing with living creatures, can hardly be evaluated. The Hong Kong Kadoorie Farms & Botanic Garden took care of them temporarily, but it didn't have appropriate technical and veterinary facilities for such a number of animals.

The attempt to save this huge group was initiated by the Turtle Survival Alliance (TSA), which arranged the transport of almost 7 000 specimens (the rest of the turtles died shortly after the confiscation) to Europe and the USA. In Europe, the rescue was organised by the EAZA (European Association of Zoos and Aquariums), which successfully imported 988 turtles to Europe. On 17th January 2002, they all arrived at the Amsterdam airport, where KLM, a Dutch air company, transported them for free. The organizers distributed the turtles to 30 European zoos in eleven countries and to several private facilities. The Czech zoos showed great compassion and considerable courage and responsibility, when they provided room and money for 250 turtles of 5 species. The Prague Zoo organised and paid three transports from the Rotterdam Zoo into its own facilities. From there, the turtles travelled to the zoos in Czech towns Jihlava, Brno, Plzeň, Dvůr Králové nad Labem, and Ústí nad Labem.

Saving the Malaysian Giant turtles

The Brno Zoo took in 20 confiscated turtles of 2 species. We took 4 males and 6 females of the Spiny Hill turtle (*Heosemys spinosa*) on 1st February 2002 and 1 male and 9 females of the Malaysian Giant turtle (*Orlitia borneensis*) on 5th April 2002.

The Malaysian Giant turtle is the biggest one of the family *Geoemydidae*. It grows to the length of about 80 centimetres and it lives in fluvial reservoirs and rivers in Borneo, Sumatra, and Malaysia.

European zoos spent considerable expenses to accommodate and breed the turtles. We completely adapted one of the rooms in the basement of the Tropical Kingdom Pavilion at the Brno Zoo. The turtles got three plastic pools (2,5 × 1,7 × 0,6 m). In two of them, there were three females in each, and in one there were three females and one male. The water surface was between 35–40 cm high, the water temperature was 24–27 °C at day, 20–22 °C at night. The air temperature above the water was 28–30 °C; under the heat and light sources it was 35–38 °C. We set the 500 W halogen lamps, placed about 30 cm high, to 12-hour photoperiods. We laid pieces of cork bark on the water surface and the turtles started to use them as shelters.

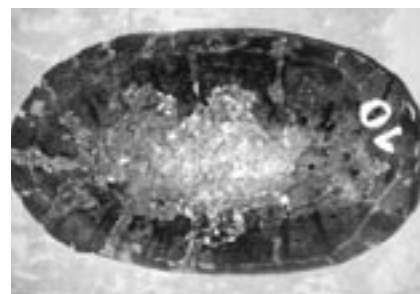
Some of the turtles ate cut up bananas, grapes, kiwi, and smaller trash fish already the second day after their arrival. They received stripped and shredded chickens and sewer rats during the next days. They were hunting big earthworms and slugs with great appetite. Some of the specimens have eaten grown imagoes of the Migratory locust (*Locusta migratoria*) and grubs of the meal beetles (*Zophobas morio*). After about a month, we started to give them a gelatinous pudding for water turtles by receipt of Harald Artner, the head of the Austrian Club of the Chelonia Friends (SFÖ). At the same time, we prepared a fruit gelatine with pieces of fruits, compotes, and vitamin-mineral additions (Vitamix, Plastin, cuttlebone). We changed the water in the pools after every feeding (three times a week) and we scrubbed and washed them with hot water. Once a week, we melted about 0,5 kg NaCl into the clean water.

We put the Malaysian Giant turtles through a thorough veterinary examination on 15th April 2002. The procedure was done by prof. MVDr. Zdeněk Knotek, CSc., from VFU Brno and MVDr. Stanislav

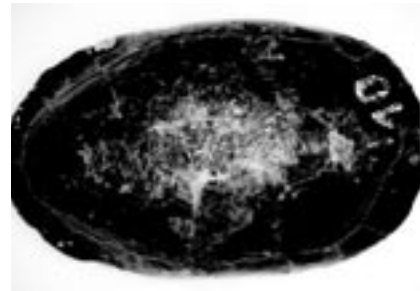
Mazánek, Ph.D., a vet from the Brno Zoo. They took blood for biochemical analysis from the upper caudal vena (*vena caccygealis dorsalis*) of all the specimens and they also completed a close examination of the carapax and the skin. The numerous wounds caused by inconsiderate transport (mostly abrasions) were infected with mildews and bacteria, which caused local necrosis of the tissue. The vets removed most of the necrotic centres and they directly applied a 3% solution of hydrogen peroxide. A bath in permanganate and imaverol solution and everyday baths in 10% iodine solution with an application right onto the wounded and inflamed places on the carapax ensued. We treated the females with anti-infective Baytril.

Because the wounds were not getting much better even after two months of treatment in water, we chose a more radical regime. We alternately let the turtles in water one day and out of water two days (on a grate from plastic vegetable boxes). We placed dishes with water on the grates, where ultraviolet lamps were shining 8 hours a day above them. We were supplementing this difficult process of giant turtle treatment by insulating them. We put them into a baby's bathtub, later we used a spacious plastic pool. In the beginning, the sunbathing took 20 minutes, after a few weeks the daily dosage was raised up to two hours. The salutary effect of direct sunlight on the affected places of the carapax was already evident after a few minutes. The healing of the necrotic centres on the plastron and carapax and the bites on the limbs and tail was evident after about 3 or 4 weeks.

After a considerable effort, seven of nine females were saved. The death of a male with repeatedly prolapsed hemipenis was a heavy loss. We were washing the prolapsed organ with Ringer's solution, we dredged it several times with a bit of sugar in the process should the tumefaction subside. We washed the sugar off with a sterile solution before its eversion. But the organ prolapsed again after



Malaysian giant turtle - the state of the carapax on 7th October 2002



Malaysian giant turtle - the state of the carapax on 10th August 2003



A prolapsed hemipenis of the Malaysian giant turtle male

several days, so we contracted the cloacal opening surgically – by suture. The suture was removed after a week whereby we didn't feed the male. But another relapse came after a few hours. In the following days, the male's state of health was getting worse and worse. A month after the first signs of prolapsed hemipenis occurred, the male died. The Brno Zoo gained another male (from another detained consignment) from the Prague Zoo in December 2004, on recommendation of the breeding coordinator and the head of the European Studbook for the Malaysian Giant turtle, Dr. Ivan Reháč, CSc.

After three years of intensive and daily care, the group in Brno is in the clear and their state of health may be considered to be stable. We managed to place two specimens into an exhibition part, the others stay in the background of the Tropical Kingdom Pavilion. Now we have to think about what to do next. To continue in successful breeding, we have to create more reasonable living conditions for these fascinating fluvial turtle giants: they will need, for example, a larger water level area and at the same time also sufficient room on land.

Saving a group of the Spiny Hill turtles

The Spiny Hill turtle is apparently widely spread in south-eastern Asia. Small populations live in isolated areas in Myanmar (Burma), Thailand, Malaysia, Sumatra, Indonesia, Singapore, and on the Philippines. This turtle has always been a rarity in European zoos and it has never been bred on our continent. The only successful breeding in the world was reported from the Atlanta Zoo, USA, in 1991.

During the Hong Kong action, the TSA imported 283 specimens to Europe, which were divided by EAZA among 25 zoos from nine countries and five private breeders. The mortality was unexpectedly high, almost 60%. By 28th February 2005, there were 21 males, 33 females, and 10 specimens of unknown sex in 18 European zoos. The largest groups were in Rotterdam Zoo (2, 5), Whipsnade Zoo (3, 3), Jersey Zoo (2, 4, 2), Chester Zoo (2, 4) and Ostrava Zoo (1, 3). In addition to the Ostrava Zoo, the most important groups in Czech zoos are in Prague (1, 3) and in Brno (1, 3).

Most of the Spiny Hill turtles (4, 6) were in critical condition (mostly because of the dysfunction of the digestive tract caused by long starvation) at the time of their arrival to Brno on 1st February 2002. The stress and the inability of the turtles to adapt to the new environment caused their anorexia.



A missing hind part of the carapax and a deep necrosis of the hind leg of the Malaysian giant turtle

The primary target of treatment was to stabilize the water regime and to stimulate the perfusion of the kidneys. We were perorally dosing Ringer's solution daily 20–40 ml.kg⁻¹ live weight to six turtles (3, 3). We were stimulating their appetite by B-complex vitamin injections (0,25–0,50 ml.kg⁻¹ live weight) and a beef Boviserin serum (2 ml.kg⁻¹ live weight). Regarding the extensive starvation of these six turtles, we approached forced feeding by probe. If the animals do not eat for long time, their digestive system cannot stand natural food; such specimens must get just easily digestible nutrients, similar to infant food. We started with carrots and we gradually increased the protein components factor. The dosages were between 10–15 ml.kg⁻¹ live weight. Such feeding was very stressful for the animals: completely exhausted turtles were retracting their heads into the carapax with all their last strength... Unfortunately, not one of the six specimen survived.

We placed the second group (1, 3) into an exhibit vivarium with a pool and plants; high humidity was supported by daily retting. We did not use forced feeding and we minimised the manipulation with them. We served them various vegetable and animal food daily; I noticed the first food intake right the next morning: one of the females was enjoying her banana. Two other females joined her during the next days and in the end even the male. Nowadays, we feed the turtles from two to three times a week. Various kinds of cut up fruits and vegetables lightly scattered with some of the vitamin-mineral preparations (Vitamix, Plastin, Roboran) form about 60% of their food. The rest of the food consists of animal components in the form of bare mice and sewer rats. Within our compound, we offer them also earthworms and slugs. Our animals evidently prefer animal protein, they take the meat right from the pincers. We have to regulate the supply of the animal food.

The three-year experience substantiates the known information: anorexia can be beaten only with thorough knowledge of the biology of the

species. The temperature and the humidity of the surroundings, as well as reducing the stress situations had essential influence on the food intake and thus, certainly on the overall state of the turtles.

Conclusion

The global turtle crisis is not and cannot be understood as a question of zoological gardens and a few cooperating enthusiasts. Nowadays a considerable amount of media exposure and publicity is necessary. Also for these reasons, there was officially declared a turtle saving campaign (Shellshock, EAZA Turtle & Tortoise Campaign) for the 2004–5 period during the annual EAZA conference in Kolmarden, Sweden, on 22nd September 2004. I think Czech zoos played a very positive part in saving the Asian turtles; the Czech Republic showed the world that it is not "just a country of smugglers". Almost one quarter of the turtles that came to Europe during the Hong Kong crisis found their asylum in the Czech Republic. The Brno Zoo breeds 7 of 36 priority kinds of turtles, for which the breeding under human care is probably the only way to survive. In addition to the Malaysian Giant turtle (*Orlitia borneensis*) and the Spiny Hill turtle (*Heosemys spinosa*), we breed the Giant Asian Pond turtle (*Heosemys grandis*), the Malaysian Box turtle (*Cuora amboinensis*), the Common Spider tortoise (*Pyxis arachnoides*), the Radiated tortoise (*Geochelone radiata*) and the Hermann's tortoise (*Testudo hermanni*).

The active attitude of the Brno Zoo in saving the two kinds of Asian turtles shows that the way was chosen correctly, when setting the species-saving breeding. Three years ago, our knowledge of the Malaysian Giant turtle and the Spiny Hill turtle needs was minimal. I am glad we have made great progress in developing the breeding methodology and that our intensive care helped to remove psychological and physical trauma of the rescued animals.

Michal Balcar

Photo by: Michal Balcar



Common swift

Common swifts in the Rescue station

Common swifts (*Apus apus*) are usually among the birds people bring to our Rescue Station for Handicapped Animals, mostly at the beginning of summer. In 2004, the station took nine swifts, five of them were returned to the wild after recovery, the other four unfortunately died. In the following lines we would like to deal with our experience that we gained during our care for the injured adult common swifts or for the found young ones that didn't know how to fly yet...

The swifts are not able to soar from the ground because of their long wings and short legs (*apus* means legless) that are used for grabbing on rock faces. Ill or injured birds, which fall to the ground, are doomed to death. Only human intervention can save them. It is very hard to breed and heal wild birds, though. The most common injury which they come with are broken wings. The small bird's bones are subtle and fragile, they break with irregular fractures and they are united by a callus – a changed bone tissue. It is a great handicap for a creature whose success depends on its flying ability. Their state of health gets worse because of the stress that is caused by the touch of human hands, or even by human presence.

The hand-fed fledglings, those which tried to leave the nest and fell to the ground, have the highest chance for survival. Mostly, they are dehydrated and hungry, but their ability to stay in so-called "hunger sleep" gives them a chance to survive. If we give these birds water with glucose and probiotics or boiled white meat mixed to a very fine mash and adulterated, their condition gets better. Contents squashed from a mealworm are also good alternative nutrients. It is important that the morsel should not contain any quinine that could block the alimentary tract. The young quickly get used to handling and they don't react startlingly to human presence. Some young swifts make a special rustling sound, when a pipette with food comes near their beak.

They can be conditioned to climb on bark, curtains, or rough walls to strengthen their wings and to start learning how to fly. At the moment that they are in optimal feeding condition and their wings are strong enough to carry them, we can set them free. The best place is where they were found or a place where they can join a flock. It's important to throw them up in the air or drop them from a raised platform, so that the aerodynamic lift will get under their wings. But they still may not succeed. It depends only on them, how strong their will to live is and how they'll use their instincts for survival.

Among the ones brought to the Brno Zoo in 2004, there was a swift, which flew into a room in military quarters and it was brought by a soldier, who thought it was a young falcon. (The beak often causes people to consider the found swift to be a bird of prey). The bird stayed in our care for about a week and then we set it free, without any harm, among high trees, above which were circling other swifts.

We have been rearing another one, a really nice fellow, together with seven young martins, whose nest fell down to the ground during a storm. Luckily, the fledglings were already feathered and didn't lose the feeding reflex, so they soon adapted to the alternative conditions in the back of the Exotic Birds Pavilion. This cheerful company was a calming factor and a good example for the young swift. It is possible to say that the swift learned a lot by watching the martins and during their feeding, the swift already made feeding sounds and it actively demanded its food. The fledglings got mealworms (and its evolutionary stages), mixture from mashed meat, Promotor and Avibion probiotics. In the morning they got water with glucose, which we served by a pipette into the beak.

The young swift was really lucky. It didn't lose much weight, it had good nutritional basics, but it still reacted as a fledgling sitting in the nest. Later, when the martins crawled out of the box (one after another they were becoming more capable and started to fly around the room), the swift slowly

started to train flying. At first it was only crawling on the table, later it clambered on a curtain and then it let itself down from a height of two meters and it circled around. Mostly, it finished on the floor somewhere in the corner, but the training was good enough for its wings and muscles to strengthen, and so, in mid August, we set it free together with the martins to the abandoned quarry „Růženin lom“ at Snake Hill, where both the species nest. Let's hope the nurslings adapted to the natural environment and survived other difficulties of a bird's life.

Together with the hummingbirds and the treeswifts, the swifts belong to the order Apodiformes, which are one of the most skilful flyers in the bird kingdom. There live two kinds of swifts in Europe – the common swift and the Alpine swift. The Common swift belongs to the highly protected species in the Czech Republic. It lives in all of Europe up to the extreme north of Scandinavia and also in the area from North Africa through Asia to Mongolia and China. The swifts belong to the species that managed to adapt to human activity. Even though it originally lived on rock faces and cliffs, it can nest in high buildings, behind chimneys, or in church steeples. It rarely nests in high tree cavities and openings. The swifts spend most of their life in the air; they ingest food, copulate, and sleep while flying.

In the end of April and beginning of May, these very sociable birds fly from their winter nesting sites in sub-Saharan Africa. In the end of May, the hens start to lay two to three eggs into the nest made of feathers and grass blades mixed with saliva from their big salivary glands. The bare young swifts are born after 18 to 19 days. They soon grow grey down. When they crave food, they don't open their beaks like many other birds, but they pull their parents feathers on the neck and the parents throw up a ball of the finest insects into their widely open beak. The young ones stay in the nest for about six weeks. They are completely self-reliant when they leave the nest. We differentiate them from the adult ones only by wider wings and plumper physique.

The swifts feed on so-called air plankton, insects that they catch while flying. They climb up to a height of about two kilometres. Unfavourable wind conditions that noticeably affect the range of food can make whole flocks leave their nesting sites and move to warmer areas with ample food. The older ones can survive the critical period thanks to their ability to decrease their body temperature and slow down their breathing and metabolism. This state similar to winter sleep can preserve a young one for more than a week, while they lose up to two thirds of their weight. Even the adult swifts can fall into this hunger sleep; adults can survive a loss of one third of their weight.

The swifts fly away as one of the first birds of passage at the end of July and beginning of August; they negotiate about 500 kilometres daily on their way to their winter nesting sites. The oldest known swift reached the age of 21 years and during its migrations from Europe to South Africa and back had flown as many as five millions kilometres.

Lubica Hrdinová