

VETERINARY MANAGEMENT OF A LARGE COLLECTION
OF SNAKES.

An analysis of experiences gained in two years of treatment and management.

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INTRODUCTION

Approximately two years ago, I was consulted by Renaldo Noordman to take care of veterinary management of his collection of snakes. The reason for consulting me was that he had recently lost quite a number of snakes. He was worried about the health of the snakes in his collection.

The collection consisted of *Boidae*, python species and boa species, about 140 snakes in total.

Table 1 gives a fair idea of the collection of snakes.

Python species:

Morelia spilotes variegata

Morelia spilotes spilotes

Liasis mackloti

Liasis albertisii

Liasis fuscus fuscus

Liasis childreni

Liasis amethystinus

Python regius

Python timoriensis

Chondropython viridis

Boa species:

Boa constrictor constrictor
Boa constrictor imperator (hondurensis)
Boa constrictor imperator (Hoke island)
Boa constrictor occidentalis
Boa constrictor ortonii

Corallus enydris enydris

Epicrates cenchria cenchria
Epicrates cenchria alvaresi
Epicrates cenchria maura
Epicrates angulifer

Lichanura trivirgata gracia
Lichanura trivirgata roseofusca
Lichanura trivirgata trivirgata

Ratsnakes:

Elaphe guttata guttata
Elaphe obsoleta obsoleta
Elaphe climacofora
Elaphe obsoleta obsoleta
Elaphe obsoleta lindheimeri
Elaphe taeniurus friesi
Elaphe oxycephala
Elaphe helena
Gonyosoma oxycephala

Colubrids:

Boiga dendrophila melanota
Boiga irregularis
Cyclagras gigas
Candoia carinata carinata

Kingsnakes:

Lampropeltis getulus floridana
Lampropeltis getulus getulus
Lampropeltis getulus californiae
Lampropeltis mexicana blairi
Lampropeltis mexicana mexicana

HOUSING AND CARE

The snakes were housed in two large rooms, in different terraria. Heating was provided through the central heating system of the room, aided by lightbulbs in the terraria when necessary. The food consisted of live rats and mice, the number depending on the snakes' size and appetite.

VISITS AND TREATMENT

Case 1:

On my first visit I examined 5 *Boa constrictor occidentalis*, housed in one terrarium, with 2 *Cyclagras gigas*, and 4 *Morelia spilotes variegata*. The faeces were mucous; vomiting and even anorexia had also occurred.

Microscopic examination of the faeces showed large numbers of *Monocercomonas*. A definite diagnosis of a severe flagellate infection was made. I prescribed a treatment with Ronidazol (20 mg/kg bodyweight for 10 days, orally).

Because of the risk of infection spreading to other snakes in the room, treatment should include all snakes.

My next visit to the collection was one week later. The owner was abroad and had not yet started the recommended treatment. This had quite serious consequences, i.e. one large adult female *Boa constrictor occidentalis* died in my hands. Post mortem revealed a severe gastrointestinal infection with *Monocercomonas* and secondary bacteria. I started treating the Boas and Morelias with Ronidazol (Ritso1 S 20 mg/kg bodyweight) and a combination of colistine and neomycin (KCN; 50,000 i.u. colistine per kg bodyweight) orally, for 10 days. The bacteria cultured (*Pseudomonas aeruginosa*) proved to be susceptible to both antibiotics. I called the owner back from his trip and instructed him to treat the snakes himself.

During treatment some peculiarities arose. A large male *Boa constrictor occidentalis*, started to fall off his roost, and showed neurological disorders, i.e. shaking of the head, falling backwards when trying to attack and he had some difficulties in catching rats. I supplied extra vitamin B-complex (0.5 ml/kg bodyweight). Some more, mostly very young (up to some months old) snakes showed identical signs and some of these died. Histological examination of the brains of these snakes showed no signs of inflammation. Concerning the effect of an overdose of Ronidazol on mammals and the fact that the Ronidazol had not been weighed very precisely I think I was confronted with an overdose of Ronidazol. After some time no further deaths occurred. The large male *Boa constrictor occidentalis* seemed to adjust to his handicap. He is able to catch rats and eat them and he does not fall off his resting place anymore. However, he has some difficulties in aiming, especially when he wants to attack.

Over the next few months I paid a visit every week and checked the snakes for signs of illness. Most of the snakes had recovered, were eating a lot and had regained strength. The Boigas even produced two clutches of eggs and brooded it out themselves. I was delighted, since they had been heavily infested. From one clutch of eggs almost all young came out. In the terrarium of the other female some problems with the heating had occurred during brooding and from 6 of the eggs malformed young hatched. These young snakes had incomplete lower jaws, some of them had only one eye. They were still alive but not viable, so they were killed with T61 intra-coeliacally.

All remaining snakes seemed healthy for a period of time.

Case 2:

Suddenly we had problems with the *Liasis childreni*,

showing signs of pneumonia, fluid coming out of their nostrils. Samples taken from the trachea were cultured and revealed no bacteria. The problem was: "What was the cause of this disease?" and "How can I cure the snakes?". We decided to raise the temperature in the terraria to about 30°C and to provide sufficient air humidity. Unfortunately both the *Liasis childreni* died. Obduction showed a severe pneumonia, with thickening of the lung tissue and clear fluid in the lung. Still the bacteriological examination of swabs taken out of the lung was negative. A number of other snakes seemed to be developing the same problems. Close examination of the housing of the snakes revealed that twice a week the terraria were cleaned with a very high concentration of chloric bleach alkaline (instead of one tablet per 10 liters of water, 5 tablets were used). This might have caused the irritation and sterile inflammation of the lungs in these snakes. In man irritation and inflammation of the lungs can be caused by chloric gasses. Close observation of the normal routine in cage cleaning brought to my attention that the snakes were taken out of their warm environment and held by an assistant for some time, thus being exposed to the draught caused by an air conditioner.

Having informed the owner about these negative environmental situations, we were able to prevent other snakes coming down with respiratory problems. Unfortunately, we were not able to cure the sick snakes.

Now for a while the collection was doing well. Except for some individual problems. An *Epicrates cenchria alvaresi* suffered from egg retention; after treatment with Ca Sandoz and oxytocine she delivered her eggs. Unfortunately the eggs were not fertile.

Case 3:

One day the female *Epicrates cenchria cenchria* decided to move to another cage, trying to pass through a space much too narrow and with sharp edges. This resulted in a 4 cm long cut in the ventral side of her neck, about 15 cm from her mouth, right through the oesophagus. Clinical examination showed the oesophagus to be perforated. Water pured into the snakes mouth came out of the wound. I sedated the animal (Methomidate, 8 mg per kg bodyweight) and stitched the wound (Vicryl 3-0), not being able to connect the cut edges of the oesophagus visibly. Fluid with amino acids (Vamin 1 ml/kg bodyweight, once per week) was administered intracoelially twice. After three weeks the first small mouse was fed. Very eager to eat, the passage through the oesophagus was without problems. With the first cast of the skin a few stitches came out, we removed the rest. The wound had healed beautifully.

Case 4:

Another problem arose concerning two *Pituophis melanoleucus*, imported from America. They started vomiting some days after arrival.

One of the snakes died very soon and examination showed an animal in very poor condition suffering from visceral gout. Histological examination of the kidney revealed a severe nephritis. The other animal died some time later with a similar image of disease and obduction. No parasites were found in either snake. In regard to renal diseases I would like to mention the following.

- Gentamycine and Neomycine when injected are known to be nephro-toxic and will cause kidney damage.
- A bacterial or perhaps viral infection may damage the kidneys as well (the bacterial infection could be excluded on bacteriological

examination).

- In snakes an impaired excretory function of the kidneys leads to the inability to excrete the uric acid. The accumulated uric acid is deposited in different places in the body, causing gout. In the visceral form the uric acid is deposited in and on the organs in the coeliacal cavity. In the joint form the uric acid is deposited in the joints. An animal with gout mostly moves sluggishly and shows anorexia. Often they die without foregoing disease. Clinically the disease is difficult to diagnose. There is no cure for gout.

Case 5:

In order to cure snakes from a mite infection the owner treated the animals with dichlorvos. A Vapona insecticide strip was put into the cage of the *Gonyosoma*. After a couple of hours the snakes fell to the ground, made spastic movements and salivated massively.

Intoxication with the choline-esterase inhibitor in the strip was evident. It took the snakes some weeks to recover completely. Immediate administration of atropine supported the recovery.

Case 6:

Some months later two *Lichanura* (one *Lichanura trivirgata trivirgata* and one *Lichanura trivirgata roseofusca*) started to vomit. Apart from vomiting one of the snakes showed signs of pneumonia and was treated with colistine (50,000 i.u./kg body-weight) according to bacteriological examination and antibiogram. The vomiting stopped for a while and the animal was regaining strength. Later the vomiting started again. This time no clinical signs of pneumonia, faecal parasites or whatever could be found.

The animal died in a cachectic state after months of vomiting. On post mortem a slight gastritis was found, but no true reason for the vomiting could be detected. The other animal only vomited. In its faeces some *Monocercomonas* were found. I took the animal home and treated it with Ronidazol (20 mg/kg bodyweight) and fed it very small prey (1 day old mice) every three days. When the animal produced some faeces it proved to be diarrhoea. Bacteriological examination revealed some *Escherichia coli* strains. Although we did not really know if these bacteria were pathogenic, I decided to treat the animal with Trimetoprim Sulfa (20 mg Trimetoprim/kg bodyweight), according to the antibiogram, for ten days. The vomiting stopped. At first every third day, later on every second day, small preys were offered and in about three months time, the animal had gained 100 g of bodyweight. About five months after this treatment the vomiting started again together with the diarrhoea. Nothing in the snakes surroundings or feeding habits had changed. Again the bacteriological examination revealed three strains of *Escherichia coli*. For the same reasons I started treatment with Trimetoprim Sulfa. Once more nude baby mice were offered as food and were spontaneously eaten. The vomiting stopped again. Up till now the cause of the vomiting in this animal remains a mystery.

Case 7:

A female *Boa constrictor* was brought to another snake collector for service. The moment she arrived she was put into the cage of the male boa, without quarantine. Although she was free of microscopic visible parasites such as worms, *Monocercomonas* or amoeba at that time, the risk for both snakes catching any disease from each other was high. After some period the snake returned home. She refused to eat and later on held the rear part

of her body in a more or less elongated position. Mr. Noordman thought her to be pregnant and did not want her to be disturbed, which unfortunately led to the death of the animal. As post mortem showed, she suffered from a serious gastro-enteritis, caused by a heavy *Monocercomonas* infection, possibly with the presence of amoeba and secondary infection with *Pseudomonas aeruginosa* bacteria. A lesson to be learned from this experience is: NEVER PUT ANIMALS FROM DIFFERENT OWNERS IN THE SAME CAGE WITHOUT A QUARANTINE PERIOD OF AT LEAST 3 MONTHS. Within this time the snakes that should be put together must be examined clinically and their faeces must be examined microscopically. If any parasites are found the snakes should be treated properly and only after re-examination of the faeces and after the three month's period, when the snakes do not have any parasites, should they be put together. A certain amount of risk of e.g. an undetected virus infection remains however. A tricky situation exists if an animal is not ill itself but functions as a virus carrier. The risk of contamination with parasites such as lung worms, *Monocercomonas* and amoebas can be avoided. The risk of infestation to the other snakes through handling, led to the treatment of all the snakes with Ronidazol to be safe. During the treatment the male *Boa constrictor occidentalis*' handicap got worse, but in time it improved again.. A male *Lichanura trivirgata roseofusca* also showed neurological problems. When touched, it curled up in a spastic way (compared to their normal behaviour). When left alone it just lay on the floor of the cage, hardly ever showing its tongue. It even refused every prey. This snake too is treated with vitamin B-complex and force-fed.

Case 8:

Problems with the respiratory system again popped

up, large amounts of slimy exudate dripped out of trachea and mouth of most of the snakes. Some of the snakes were having difficulty in breathing. Numerous swabs taken from the trachea of different snakes revealed *Pseudomonas aeruginosa*. According to the antibiogram the bacteria were susceptible to Baytril (20 mg/kg bodyweight). Treatment was over ten days. A large number of the snakes recovered. However, some did not, in these the exudation worsened and a *Python regius* died. Post mortem showed a severe pneumonia. Histological examination of the lung tissue showed chronic irritation, with thickening of the alveolar walls but hardly any sign of inflammation, no infiltration of inflammatory cells did occur.

Bacteriological examination from other still sick snakes again showed *Pseudomonas aeruginosa*. This time they were no longer susceptible to Baytril. Trimetoprim-Sulfamethoxazole (Bactrimel 20 mg/kg bodyweight) was used now.

To make things worse, one of the sick *Liasis fuscus* proved to be infected with lungworms, although it had been in captivity for quite a long time already. It was treated together with its cage mates with Ripercol (20 mg/kg bodyweight, intracoelially).

The last treatment with Bactrimel was successful for another couple of snakes. There remained 4 *Gonyosoma*, a *Morelia spilotes spilotes*, a *Liasis amethystinus*, spilling fluid from their tracheas, being very sick indeed.

Bacteriological examination was negative, so again another cause for the pneumonia had to be found.

After discussing possible causes for the disease I again asked Mr. Noordman what he was using now to clean the terraria. Despite my warnings, this proved to be a combination of chloric bleach alkaline with polyvidone-iodine. When putting these two substances together in warm water a consider-

able amount of chloric gases arose. Possibly this might have caused the irritation of the lungs with a secondary bacterial infection.

In the period before these problems occurred a couple of freshly imported snakes had been brought in. After some time these snakes showed the same signs. Although Mr. Noordman knew how dangerous it is putting different snakes together without quarantine, he had put some of these new snakes in the same room as the other snakes. These snakes had been treated with Ronidazol and Ripercol but still there might have been a chance that they had brought an unknown virus infection with them which might be responsible for the pneumonia. The histological examination of the lungs of some of the dead snakes however, contradicted this. A virological infection should be accompanied by infiltration of the lung tissue with white blood cells unless there is an immunosuppressive problem in an individual.

Bacteriological examination from tracheal swabs of the sick snakes remained negative. I decided to stop treatment with antibiotics, but supply the snakes with as much food as they wanted to eat and extra vitamins (vitamin B-complex and vitamin C). Those that did not want to eat were force-fed. The temperature in the terraria had to be raised. And water was supplemented with acetic acid (6 cc HCl 1 n per liter drinking water).

Apart from the *Gonyosoma* the other snakes are getting healthy again. Most of them eat enormous amounts of food and regain strength rapidly. After four weeks three *Gonyosoma* died, showing the severe pneumonia. Bacteriological examination of the lung revealed again *Pseudomonas aeruginosa*. Our last try to cure the last four sick snakes, is according to R. Joris the use of Pipcil (150 mg/kg bodyweight, for ten days).

After five days of treatment the snakes' health seem to be improving but treatment has not finish-

ed yet.

DISCUSSION

The larger a collection of snakes is, the more difficult it is to keep all snakes in good health. Inspection of all the snakes individually every day is not possible, but one should surely try. Strict hygiene is a must! Washing hands with a disinfectant soap between handling of the snakes is necessary. Removing faeces and urine deposits daily, disinfecting the terraria once a week with a good, harmless disinfectant avoids many problems. Avoid stress in the environment apart from routine handling as a must. One should not take out the snakes every time just for fun of showing them to people. A snake in its own environment is as beautiful and interesting as holding it in ones hand! For the snake it is more peaceful to stay in its cage, if necessary it is able to hide.

It is best to keep snakes from the same natural environment together in one room. An even ambient temperature can then be maintained. The terraria should provide hiding places! The ventilation of the terraria should be regulated and no draught must occur. Sufficient air humidity must be provided. And above all: never introduce new snakes into your healthy collection, without having a proper quarantine period!

At this time almost all of the snakes in Mr. Noordman's beautiful collection seem healthy. Soft cleaning procedures have now become routine, as have quarantine periods for every new snake to be introduced. Individual problems of course will always occur in such a large collection. But many illnesses can be prevented through good basic care and management.

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