

What is so special with Birds, Reptiles and Small Mammals Anatomical and Physiological Considerations

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INTRODUCTION:

This presentation focuses on a realistic, pragmatic, and holistic approach to making exotic animal medicine profitable and successful rather than on an attempt to persuade veterinarians with no interest in treating exotics.

FIRST THOUGHTS:

As you are dealing with special animals, you also need special equipment. But first of all you should know that these animals can be fast in escaping, so your rooms should be „safe“ and if something happens it shouldn't be too stressful for the animal and the veterinarian. The rooms should not be too high and too large, especially if birds escape from the cage all windows should be closed before you open the cage or the transport box.

A full history should be taken, assessing not only the animal's current and previous health status, but also paying attention to housing and feeding, since many animals relate to sub-optimal environmental conditions or nutritional factors. Further question should be asked if it is a single animal or other animals, especially new to the collection. Accurate identification of species (birds, reptiles) is also essential; this may influence the choice of drugs administered and the required hospitalization facilities.

Fasting Before Surgery:

Fasting should be carried out before all elective surgery in order to reduce the chances of regurgitation or in reptiles to reduce compression of lung(s) associated with large meals. In general 1-2 feeding cycles should be skipped (e.g. 2 hours in small birds, some hours in small mammals, 2-4 weeks for a large constrictor, 1-2 days for an iguana).

BEFORE YOU START:

- Understand the meaning of all the biological samples that you intend to collect.
- It is important that a thorough physical exam be performed, following a prescribed system.
- If possible observe the animal in the cage – it's attitude, movement, and reactions.
- Note the food and water that are offered – ask what usually is fed.
- Examine the droppings/feces in the cage if possible
- **PLAN IN ADVANCE** for your hands-on physical examination and sample collection! Have everything that you will need readily available!

BIRDS:

Clinical Examination

- Husbandry
- Questions commonly asked include cage size and type, perch number and type, substrate, and type of enrichment.
- Diet should be evaluated: types of food offered, nutritional ingredients and quality, frequency offered, moisture content of diet, and other methods moisture is offered - TODAY still many veterinarians think that seed diets are ok for most psittacines!!! THAT IS NOT TRUE!!!
- What Questions you should ask?
- You have to use an epidemiologic approach to pursuing the “problem” to help characterize how the disease not only may affect the individual patient being presented but other animals in the collection too.
- Next step should include specific questions about the individual(s) being presented, including clinical signs, duration of clinical signs, number of animals involved, and any treatments attempted.
- Look at the bird in the cage - how it behaves (bright and alert, fluffed feathers, difficulties with breathing), perceives the environment, movement reactions and excretions.
- It is important that a thorough exam is performed, following a prescribed pattern.
- Examine the bird closely but efficiently; minimizing the time of restraint - stress is a significant factor!
- Birds are often able to hide clinical signs for prolonged periods, and therefore present when they are seriously ill.
- Birds in respiratory distress, the physical examination should be postponed until the animal is stabilized – **Use Oxygen first!**
- While the bird is being oxygenated, educate the owner as to the potential severity of the bird's condition!
- Use ALL your senses.
- Before you catch the bird – have a look and listen!
- When you hear a beathing noise you gain a lot of information already – however remember the structure of the avian respiratory system:
 - There are several important differences in the mechanism and pattern of lung ventilation in birds. The lungs of birds do not inflate and deflate but rather retain a constant volume. Also, the lungs are unidirectionally

ventilated. The various air sacs are inflated and deflated in a complex sequence. The lungs, which are located midway between air sacs in terms of the flow of gas, are continuously ventilated in a single direction with freshly inspired air during both inspiration and expiration.

- As a consequence of the continual, unidirectional airflow, the lungs of birds are more completely ventilated than the lungs of mammals. The flow of gas and blood within the bird lung is carefully arranged to maximize gas exchange, which is far more efficient than in the mammalian lung.
- **CONSEQUENTLY: YOU CAN ADMINISTER OXYGEN AND ANESTHESIA THROUGH THORACIC AIRSACS!!!**
- There are some easy things you can do! This might be also useful to demonstrate to the owner that there is a long-term problem.
- Many bird owners never realize that their bird is malnourished.
- Some signs are very obvious – like abnormal blood feathers.
- Many signs are non specific but give you a lot of information on husbandry and nutrition – like elasticity of feathers – they shouldn't break easily!

REPTILES:

Two main sources of literature serve herpetological medicine:

Traditional veterinary medical literature and herpetological literature. Unfortunately, veterinarians tend to overlook the second one.

You will realize the deeper you penetrate this field, the more you become aware of how little we really know for sure.

When you work with reptiles you will have cases were owners and even you will think: This is not normal!

BUT: Before you start more diagnostic, and treatment ASK YOURSELF: **Is this really an issue for the animal?**

KEEP IN MIND:

Don't make a problem out of something that is a problem for the owner but doesn't pose a problem to the animal

Is there something like a Human- Reptile Relationship?

- Reptile ownership represents one of the fastest growing population of pets in the United States and Europe.
- When we started 30 years ago the saying was “a sick reptile is a dead reptile,” or in simple financial terms, buying a new reptile was cheaper than taking an ill reptile to the veterinarian. This is simply no longer the case.
- Experts aren't exactly sure if reptiles have the ability to bond with humans or not - reptiles show emotion—but in a limited form?

Anatomy, Physiology Basics

- It is actually impossible to know all the anatomical and physiological characteristics of all reptile species.

- But it is important to deal with the conditions of the species that are common in your own area.
- With reptiles there are many things that influence veterinary considerations but cannot be compared with any other animal class. We must therefore briefly address some of these "specialties".
 - temperature-dependent sex determination (TDSD),
 - Ecdysis
 - Poikilothermic
 - Preferred body temperature (PBT) Preferred optimum temperature zone (POTZ)
 - Jacobson's organ.
 - Ovipar, Vivipar, Ovovivipar
 - Parietal eye
 -

Some reptiles exhibit temperature-dependent sex determination (TDSD),

- in which the incubation temperature determines whether a particular
- egg hatches as male or female. TDSD is most common in turtles and
- crocodiles, but also occurs in lizards and tuatara.
- **Aromatase:** transforms Testosterone into Oestrogen
- To date, there has been no confirmation of whether TDSD occurs in
- snakes.
- **All forms possible:**
- **High Temperature: females (eg: Turtles)**
- **High Temperature: male (eg: Aligatorts)**

ECDYSIS:

- In a perfect world, lizards and snakes shed their old skin in a normal process, known as *ecdysis*. For the snake, this comes off in a single smooth piece, a veritable molding of the external surface of the reptile. Many lizards such as the leopard gecko (*Eublepharis macularius*) normally ingest their shedding skin at night, so that in most cases the owner never appreciates the shedding process.
- Ecdysis is a normal process, though the frequency and timing of the process can be affected by environmental conditions and pathology.

DYSECDYSIS:

- is the term to indicate abnormal or difficult shedding—when things go wrong. While there can be pathological causes to dysecdysis, improper husbandry is one of the most common underlying etiologies.
- **The spectacle of snakes and some lizards presents peculiar problems unique to these animals.**
- The primary cause for retained shed are husbandry problems, most often inadequate humidity.
- Treatment involves soaking the retained spectacle to aid its removal, sometimes with artificial tears (hypromellose) or hard contact lens wetting solution. This is best done using a wet cotton bud and rubbing from the medial and lateral canthi towards the center of the spectacle. Tightly adherent spectacles can be loosened using mucolytic agent acetyl-cysteine applied topically to the retained spectacle. Physical removal of the spectacle should be avoided initially.

- If this doesn't work, maybe wait until the next shed.
- There are geckos with functional eyelids and those without eyelids like snakes.
- E.g. Crested Gecko (*Correlophus ciliatus*) eye is protected by a transparent scale called the spectacle same like in snakes. See the difference to a Common Leopard Gecko *Eublepharis macularius*
- Most reptile eyes have a drainage system called the nasolacrimal duct that brings the tears to the nasal canal. If this duct is blocked, the tears have no place to go. For species with a spectacle that develop a blocked nasolacrimal duct, the tears will build up, thus creating a bulging spectacle. This requires surgery.
- The nasolacrimal duct is **absent in all Chelonia** that have been studied therefore tears naturally spill over the eyelids and down the sides of the face to eventually evaporate. Any fluorescein placed in the eye does the same.
- If you put any treatment/ointment in species with "lesions" on spectacles, you put it only on the skin/eyelid not on the cornea. – so it is useless.
- The treatment includes an opening of the skin/spectacle - depending on the content in the subspectacular space by incision or removal of about 25% of the spectacles.

VIVIPARY

Viviparia or live birth describes the mode of reproduction in animals whose early development (embryonic and fetal stage) takes place in the mother without being enclosed by an eggshell.

- The embryos of viviparous animals are supplied by the mother animal's circulation (nutrients, respiratory gases, excretion, water), which does not necessarily require a placenta.
- There are also viviparous representatives among the reptiles. We can find a placenta formation in various skinks and some snakes, in which the allantois and chorion of the embryo combine and attach closely to the mother's uterine mucosa.
- The transition between oviparity and ovoviviparity is partly fluid.

OVOVIVIPARITY

- The eggs of ovoviviparous animals are not deposited, but hatched in the womb, nourished by the yolk.
- The young hatch in the body of the mother or shortly after the oviposition.
- It keeps predators from eating developing eggs.
- In ovoviviparous animals, the embryo only receives its nutrients from the mother's metabolism through the yolk (yolk sac) contained in the egg, and the viviparous embryo is nourished directly by the mother's organism.

Many reptiles are ovovivipar, such as the garter snakes, almost all sea snakes, around 20 percent of the chameleons, as well as the native slow worm, the forest lizard, the European horned viper and the adder.

- A few more examples of important anatomical and physiological features:
 - **Hibernation**
 - **Circadian Rhythms**
 - **Blood and Circulation** - three-chambered heart or four-chambered heart
 - **Renal Portal System**
 - **Regeneration:** lizards can regenerate tails to some degree

- **Venom glands**
- **Respiration**
- **Renal System**
- **Reproduction - Temperature-dependent sex development**

Two associations regularly deal with reptilian medicine:

- The Association of Reptilian and Amphibian Veterinarians (ARAV; PO Box 1897, Lawrence, KS 66044-8897)
 - <https://arav.org>
- The American Association of Zoo Veterinarians (AAZV Attn: Tracy Candelaria, PO Box 7065, Lawrence, KS 66044)
 - <https://www.aazv.org/default.aspx>

PHYSIOLOGY SMALL MAMMALS

The problem with the teeth

Rabbit teeth are designed for chomping and chewing. Rabbits are herbivores, which means that they'll never have to tear meat or gnaw bones. So instead of the sharp canines that are found in the mouths of cats and dogs, they have a combination of incisors, molars, and premolars.

Their teeth are curved, and enamel is only found on the front surface of the teeth. The back surface of their teeth is coated in softer dentin, which means that the front surface wears down much slower than the back.

Rabbits are thorough chewers, and their technique involves highly organised tongue movements combined with up to 120 jaw movements per minute.

Because of the nature of their jaw muscles, rabbits chew both vertically and horizontally. This is enough to keep their teeth in good shape.

Beyond a poor diet, a leading cause of overgrown teeth in rabbits is malocclusion. This is where poor teeth alignment lessens the effectiveness of chewing. Many factors can cause malocclusion, but most cases have more than one underlying cause. It can be a combination of infection, genetic issues, and even mild trauma.