



Respiratory Infections

by Petr Necas and Bill Strand

It is, arguably, an infection that is responsible for the most deaths in captive chameleons. Spanning chameleons of all ages and heedless of wild caught or captive bred, it is the disease with a mysterious acronym, RI. It is the Respiratory Infection. It is a strange and banal disease.

And it is deadly.

For the sake of our chameleons, we must understand this disease and answer the crucial questions that will allow us to finally eliminate this plague from our terrariums. To do this we will explore what a respiratory infection is, how it takes hold, what the symptoms are, and how we can treat it.

What is a Respiratory Infection?

A Respiratory Infection (or RI) is a condition where ever-present air borne pathogenic bacteria has been allowed to reproduce unchecked in the respiratory tract and cause inflammation. Bacteria is a microscopic, living organism that, like all living organisms, gives off waste products as a result of their metabolism. In some cases, this waste product is toxic to other living creatures and causes various diseases, according to the type of bacteria. Bacteria is all around us. Therefore, we, chameleons, and every living being have had to develop immune systems that would kill bacteria and keep them from finding a suitable place in our body to settle in and multiply. Because once they start multiplying they don't stop and, although our bodies can easily process the toxic secretions of a small number of microscopic organisms, the toxins from a large population will overwhelm our systems and lead to severe tissue and organ damage and eventually death. The respiratory tract is a common place of entry because it is moist and its primary function, breathing, results in a refreshing of bacterial exposure with each breath.

We define a respiratory infection as "lower" or "upper" depending on its location:

LRI - Lower Respiratory Infection. This is an infection, or pneumonia, located in the lungs and pulmonary sacks (in chameleons).

URI - Upper Respiratory Infection. This is an infection found in the upper respiratory tract, nasal cavity and paranasal sinuses.

Both may be present at the same time, at different or similar stages, and one can develop from the other (which they often do). If left untreated, respiratory infections can expand into mouth-rot, eye infections, and temporal gland infections. Because the respiratory infection further weakens the body and taxes the immune system, RI's can allow other diseases and parasite infections to become worse. Likewise, the RI can become worse by weakness of the organism caused by other infections, parasite infestation or mistakes in husbandry..

How Does A Respiratory Infection Happen?

A respiratory infection can come from any of the many types of bacteria that are all around. Your chameleon's immune system is constantly fighting these off. And as long as the immune system is healthy a balance is kept. But once the immune system is weakened the bacteria can take hold. So why do we see so many respiratory infections in captive chameleons? Simply – inadequate care. The bad news is that we are bringing this upon our chameleons through improper husbandry. The good news is that, with education and some effort, we can fix the situation and provide an environment for our chameleons to keep their immune system in top shape.

There are five main root-causes of a Respiratory Infection

A) Improper hydration. In the wild, most of the chameleon species are exposed to high humidity in the air - up to 100% - during the night, while the daytime humidity drops significantly. A big mistake in captivity is providing low humidity at night and giving both humidity and hydration during the daytime only. By doing this, we desiccate our chameleons at the times when their bodies are designed to hydrate themselves and force them to catch up during the day. This destroys their inner balance and stresses their system. Surprisingly, chameleons drink very rarely in the wild (P. Necas, Carl Cattau, Jan Stipala pers. obs.). This is because the basic hydration happens through inhaling the moist air during the cold night.

In captivity, many chameleons behave like heavy drinkers because they are trying to compensate for the dehydration during the night. We then react by misting and fogging during the daytime when the temperatures are high. This creates unnatural pressure on the chameleon physiology and we unwittingly create the best environment for bacteria to thrive - humid and warm! The stressing of the

Symptoms of a Respiratory Infection

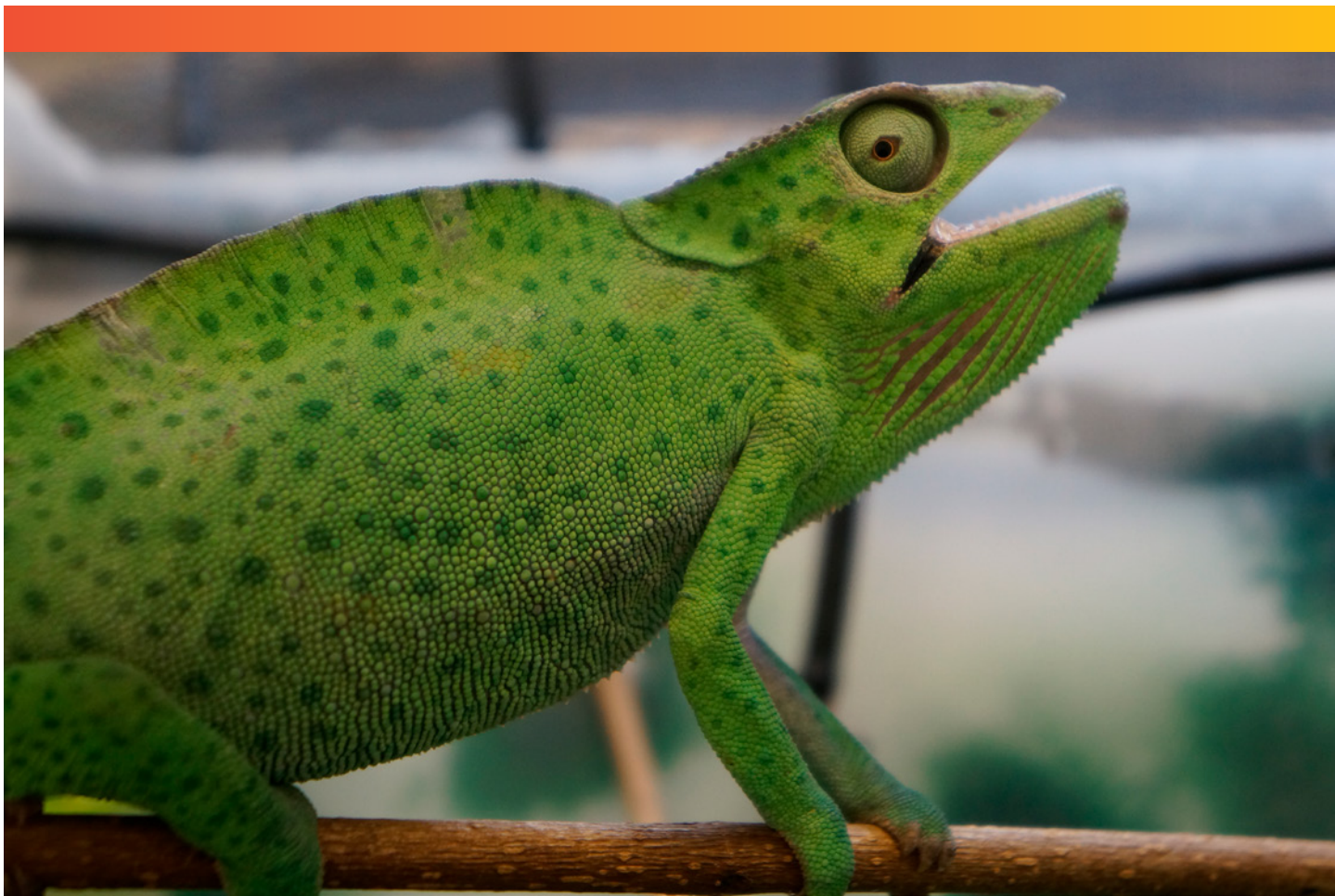
Respiratory Infections are deadly if left untreated. The sooner it is detected the sooner it can be treated. Therefore, every chameleon keeper must be on guard for the following symptoms and act with haste to consult with their veterinarian for medical treatment. Consult with The Chameleon Enthusiasts community to help you to identify the symptoms online, based on detailed analysis of the situation, photos, and videos.

Symptoms for a Lower Respiratory Infection:

- Heavy breathing
- Unnatural inflating of the body and throat
- Exposing ribs
- Sleeping head down or head up
- Strange sounds while breathing
- Gaping
- Fluid in lungs and pulmonary sacks
- Bubbles in the throat or foam
- Tetanic contractions of the body
- Sitting with head up on stretched front legs

Additional symptoms for an Upper Respiratory Infection:

- Transparent or milky discharge from the nostrils
- Swelling between the canthi rostrales above the nostrils (on the upper surface of the head between the rostrum and eyes)
- Periocular swellings (swellings around the eyes or at the base of the turrets, especially towards the nostrils)



This female *T. deremensis* is showing the signs of an advanced respiratory infection. The mouth is pointed upward to straighten the throat with the mouth open - gaping for air. Infection in her lungs has reduced air absorption and she is literally suffocating.

chameleon's systems and the strengthening of the bacterial attackers gives predictable and life-threatening results.

B) Absence of natural dietary antibiotics. Chameleons actually self-medicate in the wild! By eating pollinating insects they ingest large amounts of pollen every day. Pollen contains powerful natural antibiotics which build an anti-biotic shield which kills both bacteria and fungi just after they get into the organism and before they can take hold. If pollen is not part of the captive diet, this function is absent and the chameleons are exposed to pathogens without their natural anti-biotic shield.

C) Absence of or low doses of UV. Chameleons are in the wild exposed to UV all day long, regardless of whether they bask or sit in the bush under leaf cover. There is a range of wavelengths, 265nm to 300nm, that have been shown to have powerful anti-bacterial properties. Chameleon enthusiasts will recognize this range as very close to (and widely overlapping with) the magical 280 – 320nm range which provides the precious vitamin D3 metabolism! While the most effective anti-biotic wavelength, 265nm, sits in the dangerous-to-life UVC range (unsurprisingly), there are still anti-biotic properties in the wavelengths at the lower end of the UVB spectrum where the UVB lights used in captivity work.* Once again, we are playing catch up with what they get in the wild, but inadequate UVB exposure removes more than just the opportunity to synthesize D3. It also chips away at their defensive immunity shield.

To conclude, the main causes of RI in chameleons are:

1. **Improper Hydration (Combining high humidity with high temperature)**
2. **Absence of Dietary Anti-biotics (Bee Pollen)**
3. **Inadequate UV exposure (weak or absent UVB source)**
4. **Artificial surfaces in the cages (Breeding areas for germs)**
5. **Inadequate air exchange (Stagnant air)**

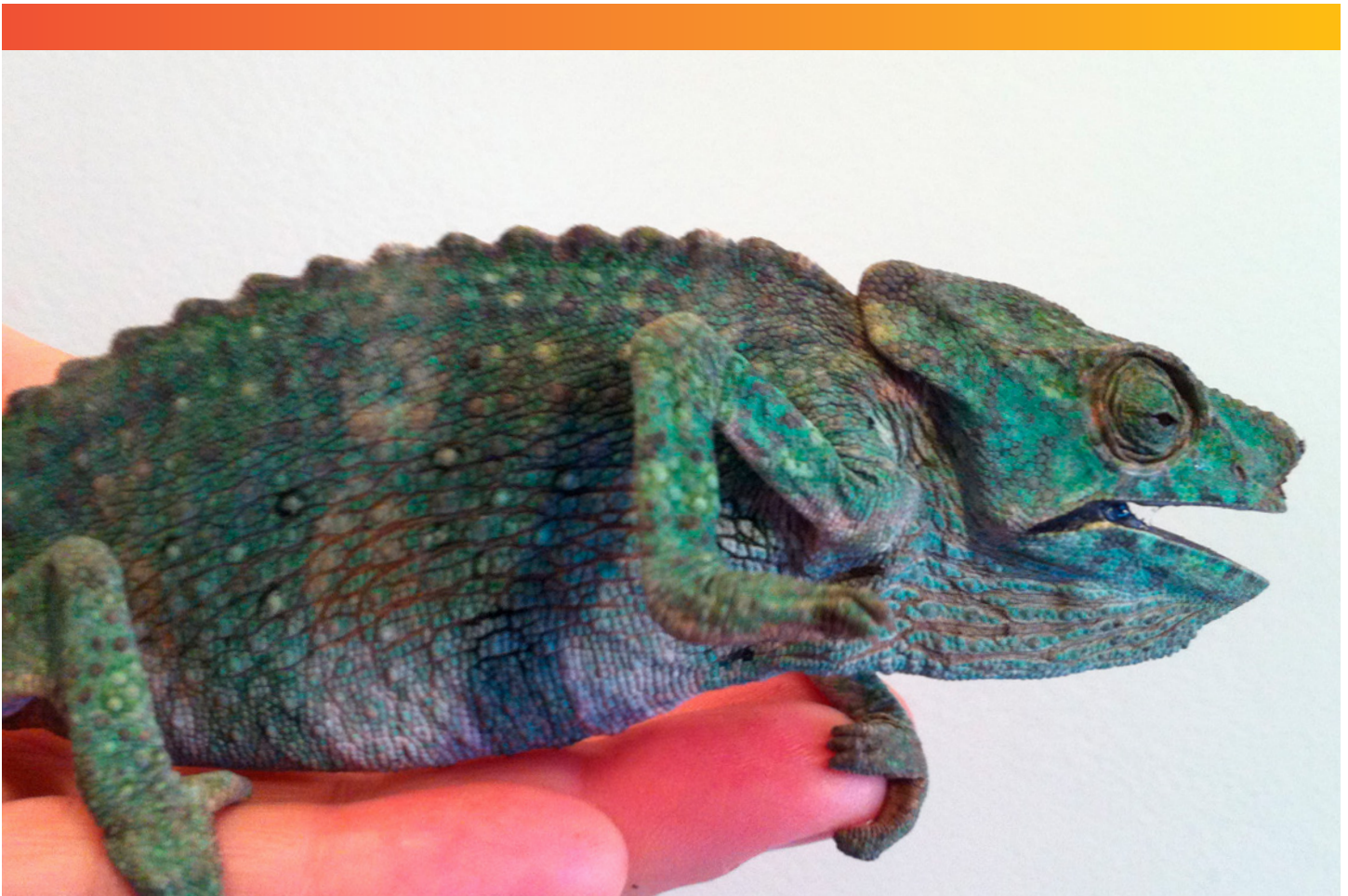
D) Artificial surfaces providing bacterial breeding grounds. Chameleons in the wild dwell on living plants and natural branches. The environment and its elements have all a bactericide and fungicide function to control the presence of these organisms in the wild. Plus, as living elements of the environment, plants possess a self-cleaning function. Dead branches still retain some of this function. In captivity, we use plastics for a number of functions including misting nozzles, plastic vines, and walls and floors of cages. While plastic items may be cleaned, none of them have the self-cleaning aspect that a live plant and natural wood can offer. Fake vines, dead moss covered fake vines, and diverse ropes made of natural or artificial fiber can get soaked with moisture. They then can get polluted by biological dust, remnants of feces, urine, dead skin, remnants of feeders and their excrements etc. If these surfaces are not kept clean and you couple that with a warm, humid environment, they can provide a perfect area for the growth of bacteria and fungi. The same improper environmental husbandry that allows infection to grow on these surfaces (hot, humid, and unsanitary) also weakens the chameleon's immune system. In this way, we actually unwittingly create hotspots for bacteria and fungi to reproduce and to spread themselves and their spores. Their concentration in the semi-isolated space of the cage rises to unnaturally high levels and they are poised to infest the chameleon organism at any suitable opportunity. Moreover, in cases where we keep the chameleons indoors, we share the environment. Hygienic practices are critical to ensure you are not polluting your own environment along side your chameleon's by an unchecked increase in bacteria concentration.

E) Inadequate air exchange. In the wild, chameleons live in the open air and wind. General air movement blows many germs away. And, while it does blow new ones to the area, there is a constant movement and this dynamic does not allow them to concentrate any one place. Terrariums, on the other hand, restrict air movement to varying amounts. Especially if they are not specifically equipped with mesh ventilation areas, they can allow air to get trapped and this can build an environment where germs heavily concentrate in one place. The dangers of this are simple. The more dangerous bio-mass is present the more possibility that it wins over your chameleon's immune system.

Treatment of a Respiratory Infection

The treatment of RI happens in two areas:

1. Acute - treatment of the infection itself,
2. Prophylactic – correcting the husbandry that created the infection.



This juvenile *T. melleri* is hours away from death with an advanced respiratory infection that did not respond to anti-biotic treatment. Whether the anti-biotic was the wrong type for the bacteria or the treatment just too late is unknown.

The Treatment of the Infection Itself

Treatment of respiratory infections is problematic and requires the assistance of a qualified veterinarian. Bacterial reproduction is usually controlled by the chameleon's immune system. It becomes out of control and of a "clinical" nature when it starts impeding a chameleon's normal function – such as breathing. Any of the symptoms listed above are an indication that the chameleon needs help knocking down the infection. The proper approach is as follows:

- A. A qualified veterinarian inspects the animal holistically as soon as possible (body, breathing and - very important - the inner space of mouth)
- B. The vet takes samples from the throat and cultivates it to identify the exact pathogen and the antibiotic that is most effective against it. This step is the way to ensure that the medication will be effective. Unfortunately, this step is rarely performed as the chameleon owner is often unwilling to pay the money the test costs.
- C. An antibiotic is selected and treatment is prescribed. If the sensitivity test is not performed you will be prescribed a broad spectrum anti-biotic that "probably" will work to some degree. Baytril (enrofloxine) is a common broad spectrum anti-biotic. The danger of using the anti-biotic that will "probably" work is that it may not work. Every medicine extracts a toll on your chameleon's body. Side effects can be fatal – depending



A number of years ago an unscrupulous importer sold a freshly imported baby *T. melleri* as captive bred. Being too young to handle the import process, most came in with health issues like this respiratory infection. The nose in the air is a tell-tale sign. Get to the vet immediately!

on the drug – so medicate only when necessary and give exactly what is required. A sensitivity test is always preferred if you can at all make it happen.

D. Antibiotic course (usually minimum 7-10 days) is executed. The first positive results during the treatment should be apparent after the third day. Due to their physiology, chameleons need more time than mammals. IMPORTANT! Even if they seem to be better, the whole course of the antibiotic treatment has to be done to the end. The entire process should be supervised by an experienced veterinarian. Focused hydration is necessary during the treatment, as dehydration is one of the common side-effects of some antibiotics.

E. Note: Abscond from dubious recommendations like giving chameleons a warm bath or exposing them to steam. Both of these have been recommended and both are inappropriate for a chameleon. This practice is good for homeothermic animals, such as mammals and birds, but this is not appropriate for chameleons. It is not logical to expose the animal to these conditions (warm and humid) that are the very cause for the outbreak of the disease itself. The logic that we need to get warm moisture breathed into the lung to facilitate the animal purging the fluids by having them come up into the throat and out of the lungs is questionable, as chameleons do not cough! The only correct way to approach this is to increase the humidity at night using cold fog from a sonic fogger.

Correcting the Husbandry that Created the Infection

It is essential to provide an environment that the chameleons require for thriving and to not compromise on something that causes the outbreak of the disease.

Please, make sure that (according to the specific requirements of the respective species):

A. The humidity is high at night and low during the day.

B. The temperature is low at night (no heat emitters at night in any case) and not too high during the day. The opportunity to bask is always available if required.

C. Misting only happens when the heat lights are off and temperatures are cool. Ambient light is acceptable if it simulates the lighting of an afternoon rain shower. Turn off basking lamps an hour before the misting system goes on and do not bring them back up until an hour after.

D. Bee Pollen is added to the diet with every meal.

E. Sufficient UVB is provided either naturally (exposure to the sun's ray rays unfiltered by glass, even in the shade) or using fresh, unexpired artificial UVB sources with adequate output.

D. Living plants and natural branches in the cage simulate the natural environment closely. Though there always has to be compromise, the closer you can get to the natural environment the better.

G. Provide adequate ventilation for the chameleon. For most species, consider using screen terrariums, glass cages with big screen ventilation openings, or even forceful air movement (chimney effect, fans, ventilators).

REMEMBER:

A Respiratory Infection is a disease caused by improper husbandry practices and our inadequate care. There is no recorded instance of a respiratory infection in the wild. We would be naïve to believe that chameleons never get infections in the wild, but the lack of examples suggest that their antibiotic diet and UV shield is highly effective. So, if we encounter a respiratory infection in our collection we must consider it a flashing warning sign that one or more husbandry parameters are critically off and must be corrected immediately.

Let us eradicate respiratory infections from chameleon captivity and see only healthy and thriving animals!

