
HAEMOPROTEUS SPECIES INFECTION AND BLISTER DISEASE IN A CAPTIVE ROYAL PYTHON (*PYTHON REGIUS*): A CASE REPORT

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Received October 07, 2024; *Revised* November 17, 2024; *Accepted* November 26, 2024

ABSTRACT

This case report describes a royal python (*Python regius*) housed in a Zoological Garden that was presented to the Veterinary Teaching Hospital University of Ibadan, Nigeria with extensive skin ulcers, anorexia, and subsequent diagnosis of blister disease and severe anaemia. The python's condition deteriorated. Necropsy revealed haemorrhage bleeding, anaemia, healing skin ulcers, and Haemoproteus species infection.

Keywords: Captive royal python, *Haemoproteus* species, Blister disease, Necropsy, Ulcers

INTRODUCTION

Haemoproteus is a genus of hematozoan parasites classified under the phylum Apicomplexa and the order Haemosporida (Valkiūnas and Iezhova, 2022). Although *Haemoproteus* species are primarily known to infect birds, they have also been reported in reptiles such as lizards, turtles and snakes. These parasites are transmitted by dipteran vectors, including sandflies and hippoboscids (Pacheco and Escalante, 2023). The life cycle of *Haemoproteus* involves asexual reproduction (merogony) within internal organs and sexual reproduction (gametogony) in the red blood cells (O'Donoghue, 2017). Many reptilian infections are subclinical, severe cases can result in anaemia, lethargy and organ enlargement due to the deposition of hemozoin, a byproduct of parasitic activity. Post-mortem findings often reveal hemorrhagic processes related to the rupture of megalomeronts in various tissues,

further highlighting the potential seriousness of these infections (Duc *et al.*, 2021). On the other hand, blister disease, a skin condition commonly seen in reptiles, is characterized by the formation of vesicles or blisters on the skin. This condition is often associated with bacterial infections or environmental stressors and is most frequently observed in aquatic turtles (Maas, 2013), although other reptiles, including snakes, can be affected. Left untreated, blister disease can lead to secondary infections and systemic complications (Mendoza-Roldan *et al.*, 2020), ultimately jeopardizing the reptile's health. The disease's impact emphasizes the importance of timely intervention to prevent further deterioration, especially in cases of concurrent infections.

This case is clinically significant because it highlights a rare co-infection of *Haemoproteus* and blister disease in a reptile, specifically a captive royal python - *Python regius* Shaw, 1802 (Squamata: Pythonidae). Co-infections of

Haemoproteus with other pathogens are uncommon in reptiles, making this case an important contribution to understanding how these infections may interact and exacerbate each other's pathology. The progression of the clinical manifestations in this case also deviates from typical presentations of either condition alone, suggesting a potential influence of the co-infection on the course of the disease. Furthermore, this case shows the broader implications for reptile health, particularly in captive environments where stress and environmental factors may worsen the severity of infections. Improved understanding of these interactions can contribute to better diagnostic and treatment strategies, thereby, enhancing reptile care in veterinary practice and conservation efforts.

Case Presentation: On May 31, 2023, an adult royal python housed in a Zoo was presented to the Veterinary Teaching Hospital, University of Ibadan, Nigeria with extensive skin ulcers (Figures 1 and 2) on the dorsal and dorsolateral (right) aspects of its body.



Figure 1: Healing ulcer on the dorsum of the royal Python measuring about 7 x 2.5 cm² (borders highlighted by yellow arrows)

These ulcers had been present for at least a week before the clinical presentation, and assessment, accompanied by a two-day history of anorexia. Upon physical examination, the clinician diagnosed the python with blister disease, a condition commonly associated with bacterial infections or environmental stressors.



Figure 2: Healing ulcer on the dorsum of the royal Python located in the distal third of the snake measuring about 12 x 3.7 cm² (borders highlighted by yellow arrows)

Treatment was initiated with Enrofloxacin intramuscularly every 48 hours for two weeks, based on culture and sensitivity testing and iron dextran intramuscularly administered once a week, alongside intermittent oral calcium with vitamin D supplementation.

Following the initiation of treatment, the python's appetite initially improved, and progressive healing of the skin ulcers was observed. However, as the treatment progressed, the snake's appetite declined again, requiring force-feeding it with mice. While handling the snake for treatment, the clinician noted the presence of a vesicle, a sign indicating the possible progression of the disease. As the python's condition continued to worsen, blood samples were collected from the heart for haematological analysis. The most significant finding was life-threatening anaemia, with a haematocrit value of 6%. Intraerythrocytic inclusions, suggestive of a parasitic infection, were observed in the red blood cells. Despite the efforts to manage the condition, the python was found dead on the morning of July 19, 2023.

Postmortem Findings: The postmortem examination revealed marked pallor of the oral mucosa and skin, indicating severe anaemia. Pallor was also evident across multiple organs, including the trachea, lungs and musculature. Petechial haemorrhages were observed on the oral mucosa, and multiple healing skin ulcers,

ranging from 5 to 20 cm in diameter, were noted along the dorsal and dorsolateral (right) surfaces. A necrotic lesion was identified near the tip of the tail, with the presence of four fly larvae (maggots). A serosanguinous hydropericardium containing about 10 ml of fluid was also observed, along with locally extensive ecchymotic and haemorrhages in the myocardium. No other gross abnormalities were detected.

Summary of Gross Findings: (i) Severe anaemia, (ii) Healing skin ulcers (5 – 20 cm), (iii) Petechial and ecchymotic haemorrhages (oral mucosa, myocardium), and (iv) Serosanguinous hydropericardium (10 ml)

Laboratory Findings: Laboratory examination of tissue smears from the liver, kidney and spleen revealed intraerythrocytic inclusions that were spherical in morphology, observed at 1 – 2 per high-power field (hpf). These inclusions closely resembled those found in the blood smear, and the morphology of the observed parasites was consistent with *Haemoproteus* species (Figures 3 and 4).

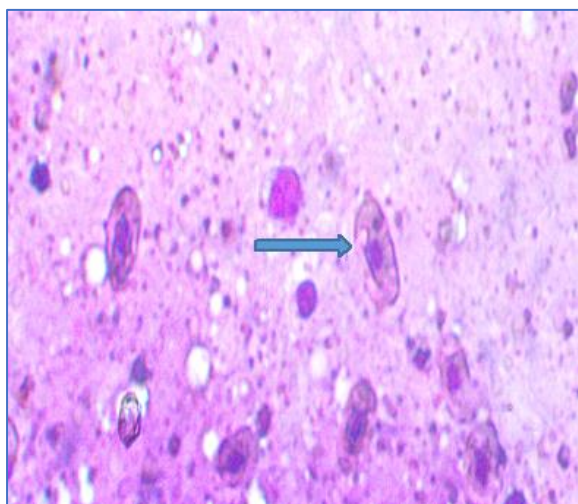


Figure 3: Touch impression smear of the liver showing intra-erythrocytic parasite (blue arrow) suggestive of *Haemoproteus* species. H&E, Mag. x200

Microscopic examination of skin scrapings, using potassium hydroxide (KOH) and lactophenol blue stains, did not reveal any parasites or fungal hyphae.

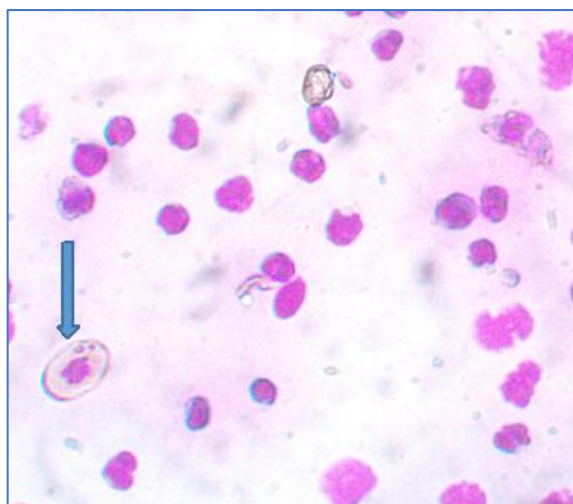


Figure 4: Touch impression smear of the spleen showing intra-erythrocytic parasite (blue arrow) suggestive of *Haemoproteus* species H&E, Mag. x200

The faecal analysis identified a mixed moderate helminth egg population, including *Strongyloides* species (2+), *Capillaria* species (2+), and *Kalicephalus* species (2+).

Postmortem Diagnosis: Blister disease and *Haemoproteus* infection (Haemoproteosis)

DISCUSSION

Infections caused by *Haemoproteus* species can play a significant role in the development of anaemia and even mortality in pythons. These parasites invade red blood cells, reducing the blood count and leading to clinically evident anaemia (Ehsani-Amrei *et al.*, 2022). In severe cases, *Haemoproteus* infections can result in systemic complications, as the parasite's impact on blood oxygenation and nutrient transport can lead to organ dysfunction (Rosyadi *et al.*, 2021; Svobodová *et al.*, 2023). Blister disease, also known as vesicular dermatitis (Maas, 2013), is commonly linked to environmental stressors such as excessive humidity and poor sanitation (Mahajan *et al.*, 2022). In pythons, this condition can severely impact their health by creating an entry point for bacterial infections, which can lead to septicemia. Blisters usually begin as fluid-filled lesions, but when infected, they can become pus-filled and spread infection throughout the body. Several factors can predispose pythons to both *Haemoproteus*

infections and blister disease as environmental conditions like high humidity and poor ventilation can create conditions that lead to the development of blister disease. Also, a weakened immune system due to malnutrition increases susceptibility to infections. Moreover, stress factors such as overcrowding or frequent handling raise stress levels, making the animal more prone to diseases. Similar cases involving *Haemoproteus* infections and blister disease have been documented in reptiles, highlighting the importance of environmental control and timely medical intervention. For instance, a study demonstrated how *Haemoproteus* infections caused significant haematological changes in reptiles, leading to anaemia and increased vulnerability to secondary infections (Veerselvam *et al.*, 2018). Additionally, other reports have shown that untreated cases of blister disease can quickly progress to septicemia, resulting in death within a matter of days (Rich *et al.*, 2023).

However, treating haemoproteosis in snakes presents a unique set of challenges like diagnostic difficulties, accurately diagnosing *Haemoproteus* infections requires specialized tests, such as blood smears or PCR, to identify the parasite. Another challenge is limited treatment options where antiparasitic drugs are often ineffective against *Haemoproteus*, and supportive care, such as managing anaemia and preventing secondary infections, is usually required. Environmental management such as maintaining proper environmental conditions is crucial for recovery but can be difficult to achieve in practice. Improper humidity, in particular, can exacerbate both haemoproteosis and blister disease.

Conclusion: This case of a python with concurrent *Haemoproteus* infection and blister disease highlights the significant impact of co-infections on reptile health, particularly the severe anaemia caused by *Haemoproteus* that contributed to the snake's decline and death. Environmental factors, such as poor humidity and sanitation, likely played a role in the development of blister disease, underscoring the importance of proper husbandry in captive reptiles. Early diagnosis and intervention are essential for managing such infections, as delays can result in

rapid health deterioration. The case also points to the need for further research into *Haemoproteus* infections and co-infections in reptiles, which could improve health management strategies in captivity.

ACKNOWLEDGEMENTS

The authors like to express their gratitude to the management and staff of the Veterinary Teaching Hospital, University of Ibadan, Nigeria especially the Clinical Pathology Unit of the Hospital for providing the facilities and support essential for this study. Their contributions were invaluable to the successful completion of this case report. The brave registrars especially Dr Ogunro, B. N. for their never-ending dedication in the foray of wildlife disease diagnostics.

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