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Suspected infection with *Kapsulotaenia sandgroundi* (Carter, 1943) in komodo dragons (*Varanus komodoensis* Ouwens, 1912) on Rinca Island, East Nusa Tenggara, Indonesia

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ABSTRACT: This article describes the infection with *Kapsulotaenia sangroundi* (Carter, 1943) in the komodo dragon (V*aranus komodoensis* Ouwens 1912) at Loh Buaya on Rinca Island, Komodo National Park. A newly dropped dragon faeces sample was collected and preserved in the SAF solution. Native parasitic examination was performed under a microscope (40x objective magnification). Environmental observations were performed to obtain additional information on the life cycle and transmission of the parasite. Observation of faecal samples revealed the presence of cestode eggs in the egg packaging (capsules). One of the five samples showed a positive result (20%). The life cycle of Kapsulotaenia is intricate and highlights the importance of understanding the parasitic relationships in ecosystems. Understanding this infection is crucial for the conservation and management of Komodo dragons, as it highlights the need for monitoring health issues in their natural habitat.

Keywords:
cestode, helminth, komodo dragon, komodo monitor, lizards

■ INTRODUCTION

Komodo dragon (*Varanus komodoensis* Ouwens, 1912), the world's largest lizard, is an apex predator native to Indonesia. Found primarily on the islands of Komodo, Rinca, Flores, and Gili Motang, this creature plays a crucial role in its ecosystem. However, the intricate web of life surrounding these magnificent reptiles includes various parasitic relationships that can significantly affect their health and survival. In the case of the Komodo dragon, various parasites can inhabit its body, including protozoa, helminths, and ectoparasites. The presence of parasites in Komodo dragons can lead to various health issues. These parasites can lead to diseases, affect the immune system of dragons, and influence their behaviour and reproduction. One cestode has long been known to infect the komodo dragon, *Kapsulotaenia sandgroundi* Carter, 1943.

Understanding cestode biology is essential for effective Komodo dragon conservation strategies. This article aims to report the recent prevalence and describe the possible life cycle and transmission of *Kapsulotaenia sangroundi* (Carter, 1943) among komodo dragon (*Varanus komodoensis* Ouwens 1912) on Rinca Island.

■ CASE

This case study was conducted in August 2024 at Loh Buaya, Rinca Island, Komodo National Park, East Nusa Tenggara, Indonesia. Five newly dropped dragon faecal samples were collected and preserved in the sodium acetate-acetic acid-formalin (SAF) solution. Native parasitic examination was performed under a light microscope (40x objective magnification) (Figure 1). Environmental observations were made to obtain additional information on the parasite's life cycle and transmission.

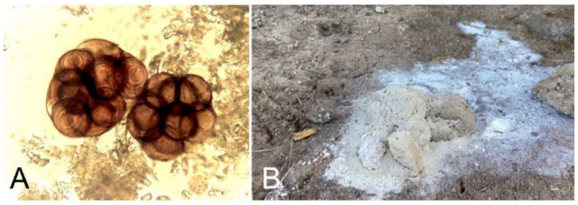

Figure 1. Suspected infection with *Kapsulotaenia sandgroundi* (Carter, 1943) in komodo dragons. (A) Egg packets (egg clusters) of *Kapsulotaenia sandgroundi* (40x objective magnification), (B) A newly dropped feces of Komodo dragon.

■ RESULTS AND DISCUSSION

Observation of fecal samples revealed the presence of cestode eggs in egg packages (capsules). One out of five samples showed a positive result (20%). We suspect the eggs to be of the species *Kapsulotaenia sandgroundi* which was first

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reported as *Proteocephalus sandgroundi* by Carter (1943) (de Chambrier 2006). Morphologically, the eggs are clusters of several eggs encased in an outer envelope or capsule (Figure 1). Cetoda of the genus *Kapsulotaenia* are known to parasitize reptiles, especially lizards (de Chambrier *et al.* 2015) and snakes (Halan & Kottferova 2021), and also on frog (Marsella & de Chambrier 2008).

According to Jones and de Chambrier (2016), *Kapsulotaenia sandgroundi* is placed in the following systematics:

Class : Cestoda,
Order : Proteocephalidea, Mola, 1928
Family : Proteocephalidae La Rue, 1911
Subfamily : Acanthotaeniinae Freze, 1963
GenusAS : *Kapsulotaenia* Freze, 1963
(Syn. *Capsulotaenia* Freze, 1963)

Proteocephalidean cestodes have an indirect life cycle (Halan & Kottferova 2021). This indirect life cycle complicates transmission and limits the incidence of infection but can maintain the number of parasites in the environment. In this case, the intermediate host acts as a reservoir.

The life cycle begins with the excretion of eggs by the adult worms (Figure 1). These eggs are typically passed out of the host's body through the faeces. Eggs with thick shells are usually resistant to environmental stressors, which aid their survival. On Rinca Island, where annual temperatures are quite high and humidity is low, it is challenging for parasites to survive. Once the eggs are ingested by an intermediate host, often a herbivorous animal, the larvae hatch within the host's digestive system. The larvae then migrate to various tissues where they develop into cysts. This stage is critical for parasite development and allows it to evade the host immune system. The larvae continue to grow and form cysts in the muscles and organs of the host. This stage not only supports parasite growth but also facilitates its transmission to the final host.

The intermediate host plays a significant role in the life cycle of Kapsulotaenia. These are prey animals. We still have limited information and evidence regarding which animals can act as intermediate hosts. It is possible that the vertebrate animals that the Komodo dragon prey on are intermediate hosts. Alternatively, insects preyed upon by the young Komodo dragon may also be intermediate hosts. We have a wide spectrum of prey animals to determine whether the Komodo dragon lizard is an apex predator.

The final host is the Komodo dragon, which is infected after consuming infected prey. They mature into adult worms. The adults cestode can then reproduce, laying eggs and continuing the cycle.

The prevalence of *Kapsulotaenia sandgroundi* infections among Komodo dragons in Komodo National Park may be influenced by several factors, including the density of prey populations, health of the ecosystem, and interspecies interactions. Research indicates that high densities of prey can lead to increased tapeworm transmission rates, potentially resulting in higher infection rates among dragon populations.

Various environmental factors affect the life cycle of Kapsulotaenia. As dragon faeces are solids, the presence of rain can help egg dispersion spread over a wider area of contamination. Temperature, humidity, and the presence of suitable hosts can either promote or hinder the development of eggs and larvae. For instance, warmer temperatures may accelerate the hatching process, whereas extreme conditions can lead to a decline in egg viability.

■ CONCLUSION

Kapsulotaenia sandgroundi occurs in the observed Komodo dragon (20%). Further research is needed using other methods to obtain more complete epidemiological data. Researchers have noted that the presence of *Kapsulotaenia sandgroundi* can affect the overall fitness and survival of infected dragons. The life cycle of Kapsulotaenia is intricate and highlights the importance of understanding parasitic relationships in ecosystems. Understanding this infection is crucial for the conservation and management of Komodo dragons, as it highlights the need for monitoring health issues in their natural habitat.

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