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The Study of The Varanus Komodoensis Venom

Junzhe Yan *

Beijing No.80 high school, Beijing, China

* Corresponding Author Email: jiashujiao@ldy.edu.rs

Abstract. As a very ancient and mysterious species, Varanus komodoensis is the world's largest monitor lizard, the world's largest living lizard, and the last descendant of the Australian biota, his mystery makes scholars all over the world want to uncover its mysterious veil. This article studies exactly what he is most famous for, namely the authenticity of his venom and the way it hunts. This article examines the many aspects known about it, including its venom, its drool, and the truth about its hunting methods. And concluded that its method of hunting was relatively simple and crude, using its strong torso function to maximize the lethality of its strong jaw and strong tail, quickly stunning and killing its prey, instead of using what people used to think. To hunt with virus-filled saliva or venom-filled glands. The main purpose of this study is to provide a better understanding of what is Komodo dragon. To enrich its image in the eyes of the people. And to dispel some timeless misconceptions, that they are very mysterious and fascinating creatures, that deserve protection and numbers are not many that they need help even more.

Keywords: Varanus komodoensis, Venom, Monitor, Hunting strategy.

1. Introduction

The Komodo dragon, as if the Varanus komodoensis, is the world's largest living lizard. It is found mainly in the Indonesian Lesser Sunda Islands, including Komodo, Rinca and Flores Islands. The average adult Komodo dragon is 2-3 meters long and can weigh 70-90kg. They are excellent predators, with sharp teeth and very powerful tails, and besides that, this animal is also the sole remaining evidence of the existence of the Australian megafauna[1-4].

In terms of the place of the food chain when it comes to the Komodo dragon, it’s the indisputable apex predator. This means it is at the top of its food chain, they pray on large mammals such as deer and wild boars, and even occasionally on its own kind or smaller Komodo dragon. As an apex predator in the ecosystem, it plays an important role in controlling prey populations and maintaining a balance of nature.

There are some differences in the research on the Komodo dragon[5], which mainly Komodo dragon in the research emphasis, method, depth and breadth. In foreign countries, especially in Australia, the United States and other countries, researchers usually pay more attention to the ecology of Komodo dragon, its behavior and the biological characteristics of its venom. Many studies have focused on its hunting behavior, ecological adaptation and the relationship with the environment. At the same time, research abroad also includes the monitor lizard's genomics and conservation biology to understand its evolutionary history and conservation needs[6]. On the other hand, in China, Relatively little research has been done in China, focusing on the basic biological and ecological characteristics of Komodo dragon, such as morphological characteristics, habitat and behavioral habits. The research on its venom and its biological function is relatively weak.

2. The Definition of Venom

2.1. The Basic Definition of Venom

In biology, Venom is a biologically active substance produced by certain animals, such as snakes, spiders, scorpions, certain fish, etc., they inject venom into other organisms through specific

physiological structures, such as glands, teeth, or spines. The main functions of venom include three aspects. Firstly, venom can be used for hunting prayers, as some animals use venom to kill or paralyze their prayers to hunt down animals. Secondly, venom can be used to protect animal life, and some animals use venom to paralyze predators to survive. Finally, some organisms may use venom to compete for habitats or resources and use venom to affect the survival ability of competitors.

In chemistry, venom is a complex compound synthesized by living organisms, typically consisting of proteins, peptides, enzymes, and other biologically active molecules. These two components can function within living organisms. Firstly, there is biocatalysis, as some venoms contain enzymes that can accelerate certain biochemical reactions, thereby affecting the physiological functions of the target organism. Secondly, there are bioactive substances, and venom may contain various small molecules with specific biological effects, such as nerve agents, cell toxins, etc.

2.2. The Function of Venom

Venom plays a variety of important roles in predation, digestion, and defense. Firstly, there is predation, which is divided into two ways: one is to numb and pray, and the other is to improve hunting efficiency. The function of paralyzing prey is that many predatory animals use venom to quickly paralyze their prey, making it unable to resist and therefore easier to capture. For example, snake venom can affect the nervous system of prey, leading to paralysis. Paralyzing prey can improve hunting efficiency, and using venom for hunting can give predators an advantage over prey. For example, poisonous spiders rapidly incapacitate their prey by injecting venom, increasing the chances of successful hunting. The second type is the role of venom in digestion, and the digestion of giant lizards is divided into two methods: assisted digestion and dehydration.

Assisted digestion refers to some venoms containing digestive enzymes that can break down prey tissues, making them easier to digest after capture. Some snakes use enzymes in their venom to rapidly break down the structure of their prey's body, accelerating digestion. Dehydration, on the other hand, is caused by certain venom components that can cause prey to lose water, which also helps accelerate digestion and reduce the likelihood of prey escaping. The third is the role of venom in defense, which can be divided into two ways: deterring predators and self-protection. Deterrence of predators is the main way many organisms use venom as a defense mechanism to deter or repel predators. For example, scorpions and spiders can release venom to protect themselves from predators when threatened. Venom is also a way for animals to protect themselves. Some organisms release venom even when attacked, participating in counterattacks and protecting themselves. Poison dart frogs and others secrete deadly toxins through their skin. If a predator attempts to attack, it will be affected by the venom.

In summary, venom plays a crucial role in the survival strategies of organisms. It not only helps predators capture and digest prey more effectively but also provides a protective mechanism for prey to ensure their survival in the food chain. The diversity and complexity of venom make it an important biological feature of ecosystems.

2.3. The Biological Mechanisms of The Venom

To explain the biological mechanism of the venom, this article divides it into four parts for analysis and discussion, namely the structure of the gland, the formation of the venom, the release of the venom, and the function of the venom.

Firstly, Venom glands are special glands that produce and store venom. Some animals have multiple venom glands in or on their bodies. These glands usually have the following characteristics: the glands can placed in many organs or serve different purposes, and the venom within is constructed with cells. To be specific, the main components of venom include proteins, peptides, enzymes and small molecular compounds. The releasing process can be separated into stimulation, Contraction and secretion, and last injection. Lastly, the function of the venom can be distinct in two ways, some can interfere with the nerve system and the other kind can break the cell structure.

Although venom glands were found in the jaw of the giant lizard during CT scans, these glands do not produce the well-known venom and do not meet the standards for venom. They play a very insignificant role in hunting. This venom gland is the ancestor of the monitor, and according to current evidence, it has been found in almost all existing monitors. In large surveillance cameras, such as the world's largest live monitor or even the world's largest surviving lizard, the Komodo dragon, its venom glands can be said to have almost no impact on prey. Because they hardly need this almost ineffective venom to hunt and kill, their glands have almost completely degenerated. A large proportion of glands have been found in some medium or even small monitors, such as tree monitors, whose relatively small size allows them to occupy relatively low ecological niches. This will cause their venom glands to not completely degrade, as they require any possible means to protect and hunt themselves. Even if these are set aside, the venom released by the venom glands on trees will make it harder for wounds to coagulate after being bitten. Many lizards, even some iguanas, have glands with the same function, and the venom works in small to medium-sized monitors. Relatively useful. Its effect will be relatively strong, but in large monitors, this so-called venom has basically lost its effectiveness

2.4. Observation and Comparing Venom Glands Between Large and Small Monitors

Based on years of experience in handling monitors and consulting information, for example, for small monitors like the blue tree monitors, its venom is relatively stronger, and its glands are not so completely degraded[7]. The Blue Tree Monitor Lizard's bitten wounds almost always bleed continuously, which obviously makes it difficult for blood to clot, but that's all. It only takes a relatively long time to recover from being bitten by a blue tree lizard of the same size. However, for large or medium-sized monitors, like the Asen water monitors, the author has also been injured multiple times. The wounds would have gushed blood after being bitten, but they would have coagulated relatively quickly because they were caused mainly by bleeding from wounds that were too deep and too large. The main reason for presenting these cases is that they were bitten because their hands were used as food, which makes these observations more valuable and worth discussing.

The world's largest lizard, the Komodo dragon (Varanus komodoensis) is known for its unique hunting strategy and powerful body structure. The most common methods used by Komodo dragons are biting and whipping. Their strong jaw muscles allow them to exert a massive bite force that rips through the flesh of their prey. The bite is not only quick and lethal, but it can also quickly knock the victim into a coma, reducing the chances of escape. The tail of the Komodo dragon is also strong, making it an important weapon in the hunt. In the face of larger prey, they will use the tail for whipping, causing serious damage. This use of force not only knocks out the prey in an instant but also serves as a deterrent to other potential competitors. By combining strong jaw and tail muscles, the Komodo dragon demonstrates its ability to survive as a top predator and its indispensable role in the ecosystem. By using this hunting strategy, the Komodo dragon can effectively obtain food, meet their physiological needs, and maintain the stability of their population in natural selection. These are just a few of the things we've learned about its hunting in recent years, and we now have a pretty good idea of how it's done.

2.5. The Unique Hunting Skills and Strategy

The most special thing about the Komodo dragon is. He was part of the extinct Australian biota. He is also the only surviving member, and his life habits are very special and useful for us to study the extinct Australian biota. as an apex predator. It actually originated in present-day Australia. They split off from Australia to now Southeast Asia, and settled there. It did not choose to continue up north, instead, it settled on what are now the islands of Rinca and Florence and nearby islands. What makes it even more special is that it is currently the only member of the lizard that feeds on large mammals in a way that no other lizard can match. As a matter of fact, of all the carnivorous living lizards, the chokehold is a very difficult technique, for Komodo dragons in dealing with large mammals to achieve such a technique. The rest of the large and medium-sized lizards, even those like the Asian

water monitors, will only shake their heads wildly after biting their prey. But Komodo would rushes to the legs of his prey, snapping them off and crippling them, or it'll rushes straight to the belly. Or even use its powerful tail to strike the prey so that it faints. After a series of fights, they eventually rip open their prey's throats and allowing them to a quick death.

2.6. The Poison Saliva Theory

Another hypothesis is that the Komodo dragon's venom actually came from the bacteria in his mouth and that the bacteria came from his saliva because after every hunt, the Komodo dragon. Would not clean his mouth, resulting in his teeth leaving a lot of animal flesh and entrails, which led to these entrails and flesh in his teeth maggots, corruption, and eventually becoming many, many bacteria. When a Komodo dragon hunts and kills, he carries the germs into the animal's bloodstream, where he gnaws the animal. The process fills the blood with bacteria, which causes the animal to die quickly. This method of hunting has been popularized in many documentaries, especially a few years ago, but does it prove him right? According to our research in recent years, this is not correct[8]. Monitor lizards have very clean mouths, and they have very little bacteria in their mouths, we've looked at a lot of monitor lizards' mouths, and if you open it up, all we can see is the structure of their mouth, we don't see as much carrion and bacteria as we previously thought. So our conclusion right now is very simple. There are few bacteria in the mouths of the monitor lizards, and they can't use them to hunt because they don't exist[9-10].

There are many misunderstandings about the Komodo monitor lizard that we can't solve right now, because as the last member of the Australian giant biota, there are so many questions about him that we need time to solve them, but there is no time to lose because its population is plummeting. As one of the largest monitor lizards in the world, it is very marvelous, and people need more resources to invest, to protect it, to keep its population growing, and to learn more about it.

3. Conclusion

There is no strong correlation between the hunting behavior of Komodo dragons and the properties of their venom. This study delved into how Komodo dragon use their physical strength and muscle mass to efficiently kill their prey. From the observation of several hunting events, we found that when the Komodo dragon attacked their prey, they usually chose to use their strong jaw and tail muscles for biting and whipping. Make it faint, thus further reducing its resistance to provide time and space for the monitor lizard to eat. Taken together, the results suggest that the Komodo dragon's hunting strategy is a result of survival adaptation and that its robust size plays a key role in this process. This study not only reveals how monitor lizards enhance their hunting success through physiological mechanisms but also provides new insights into their role in ecosystems. The significance of this research is that by revealing the relationship between Komodo dragon venom and hunting behavior, we can not only better understand the biology of the species, but also help develop more effective conservation strategies, to ensure the survival of this critically important top predator in its ecosystem. The study also provides insights into the hunting mechanisms of other reptiles and expands our understanding of animal behavioral ecology.

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