بنام خداوند جان آفرین حکیم سخن در زبان آفرین

Venomous animals

Edited by Rouhullah dehghani

جانوران زهردار

ارایه:دکتر روح اله دهقانی
استاد دانشگاه علوم پزشکی کاشان

Professor of Kashan University of Medical Sciences

راز بقا و ماندگاری موجودات زنده در طبیعت: هر موجودی برای ماندگاری وبقا در طبیعت به ابزار ها یا موادی مجهز شده است زهر یا سم یکی از این مواد است

- **جانوران زهری در طی دوران طولانی تکاملی خود به چهار دلیل عمده مجهز به مواد و ترکیبات شیمیائی شده اند**
- **الف– دفاع در برابر دشمنان**
- **ب– به عنوان وسیله شکار و کسب غذا**
- **ج–هضم غذا**
- **د–جفت یابی و انتخاب طبیعی**

تمام موجودات برای زنده ماندن و ادامه نسل دارای سلاح یا توانایی ویژه خود هستند بعضی از زهر و بعضی دیگر از ابزار و یا روش های دیگر برای بقا استفاده می نماید

ابزار و یا روش های دیگر بقا مانند:

- **قدرت زاد آوری زیاد**
- **پنجه و دندان**
- **قدرت لگد یا جفتک**
- **زندگی اجتماعی**
- **دوندگی**
- **گندگی**
- **فعالیت در ساعات مختلف شبانه روز**

تفاوت ابزار بقا در مارهای زهردار و بدون زهر :

- مارهای زهر دار با تزریق سم به هضم غذا کمک می کنند و اسید معده ضعیف تری نسبت به مارهای بدون زهر دارند.

- مارهای بدون زهر اسید معده قوی تری نسبت به مارهای زهر دار دارند .از این نظر رو به تزریق سم نیاز ندارند.

شکار پیتون در آفریقا: شکارچی ها باپوشش مناسب پا پیتون را شکار می کنند حتی با وجود پوشش مناسب دچار مشکلات ناشی از اثر اسید معده در فرد می شود

- - مارهای بدون زهر در سلول های خود میتوکندری های پر انرژی تری نسبت به مارهای زهر دار دارند .از این نظر قدرت ماهیچه ای بیشتر و تحرک بیشتری دارند.

رتیل و عنکبوت یک نوع رژیم غذایی دارند ولی ابزارشان متفاوت است

رتیل ها دارای کلیسرهای بزرگ هستند زهری نیستند عنکبوت ها کلیسرهای کوچک دارند و لی زهر دار هستند

- **Overview of venoms and poisons**
- **Venoms** and **Poisons** have developed as an evolutionary strategy to assist:
- **prey acquisition**
- **prey digestion**
- **defense against predators**
- **and mating**

Venoms vs **Poisons**

Venoms are complex mixtures of substances(fractions and enzymes)

Poisons are more often single substances or closely related groups of substances(Paederin and Cantaridin).

جانوران زهری به دو شکل به انسان یا حیوان آسیب می رسانند:

۱ – اکتیو

تزریق زهر با استفاده از نیش یا ضمائم دهانی به منظور دفاع از خود به بدن انسان

۲–پاسیو

دفع ترشحات زهری از قسمت های مختلف جانور به منظور دفاع و تماس آن با بدن انسان

مکانیسم عمل زهر بعضی از جانوران سمی

- **Neurotoxic (black widow spider)**
- **Cytolytic, Hemolytic (brown recluse spider and H.L in Iran)**
- **Hemorrhagic (moth larvae)**
- **Vesicating , blistering (blister beetles)**
- **Hemotoxic (Viperidae)**
- **Neurotoxic(Elapidae)**
- **Myotoxic and Neurotoxic(Hydrophiinae)**

- **Specific types of venom or poison effects**
- **Neurotoxins – cause paralysis or interfere with nervous system function.**
- **Myotoxins** - damage muscle.
- **Haemotoxins** - **affect blood clotting.**
- **Haemorrhagins** - damage blood vessels bleeding.
- **Haemolysins** - **damage red blood cells.**
- **Nephrotoxins** - damage the kidney.
- **Cardiotoxins** - **affect the heart.**
- **Necrotoxins** - cause death of tissue

The toxicity, variation, and duration of the symptoms depends on the following factors:

- Animal species
- Animal age, size, and nutritional status
- Healthiness of the Animal 's stinging or biting apparatus or (telson ,fangs, chelicer)
- Number of sting or bites and venom quantity injected
- Depth of the sting or bites penetration
- Composition of the venom
- Age of the victim
- Health of the victim
- Weight of the victim relative to venom amount
- Presence of comorbidities(existence of other diseases)
- Treatment effectiveness

Envenomation frequency and mortality

Venomous snakes(about 5000000) , >125,000 deaths/year.

Scorpions,(about 1500000) approximately 5,000 deaths/year.

Stinging insects(more than10 million stings/year), hundreds of deaths

Puffer fish – several hundred deaths/year.

Jellyfish – possibly a few of deaths/year.

Spiders – perhaps 10-50 deaths/year.

Stinging fish – perhaps 1-10 deaths/year.

Venomous molluscs – perhaps 1-10 deaths/year.

List of major venomous animals

Arthropoda (Active)

- **Honey Bee**
- **Paper Wasps**
- **Hornet**
- **Yellow Jacket**
- **Velvet ants**
- **Bumble Bees**
- **Red Imported Fire Ant *(Solenopsis invicta)***
- **Scorpions**
- **Spiders**
- **Centipedes(*Scolopendra gigantea*)(is the only scolopendra that could kill a human being)**
- **Bombardier Beetles**
- **Whipscorpions**
- **Water bugs**

Other Animals (Active)

- **Snakes**
- **Lizard**
- **Gila monster**
- **Jellyfish (**stinging soft gelatinous marine animal)
- **Blue ringed octopus**
- **Platypus**
- **Stingray**
- **Cone snails**

Other Animals (Passive)

- **Millipede** A wide variety of toxins are involved, the type depending on species of millipede, but they include benzoquinones, hydrogen cyanide, benzaldehyde, phenol, monoterpenes and peptides
- Blister Beetles(Cantaridin)
- Rove Beetles(Paederin)
- Caterpillars (Haemorrhagins)
- Stonefish(Tetradotoxin)
- Puffer fish (Tetradotoxin)
- Golden poison frog(Batrachotoxin)
- Cane toads(Bufotoxin)
- Venomous echinoderms(Neurotoxin)

- **Marine venoms and poisons**
- The marine environment contains many venomous and poisonous animals.

- waters contain some of the most lethal species, including the box jellyfish

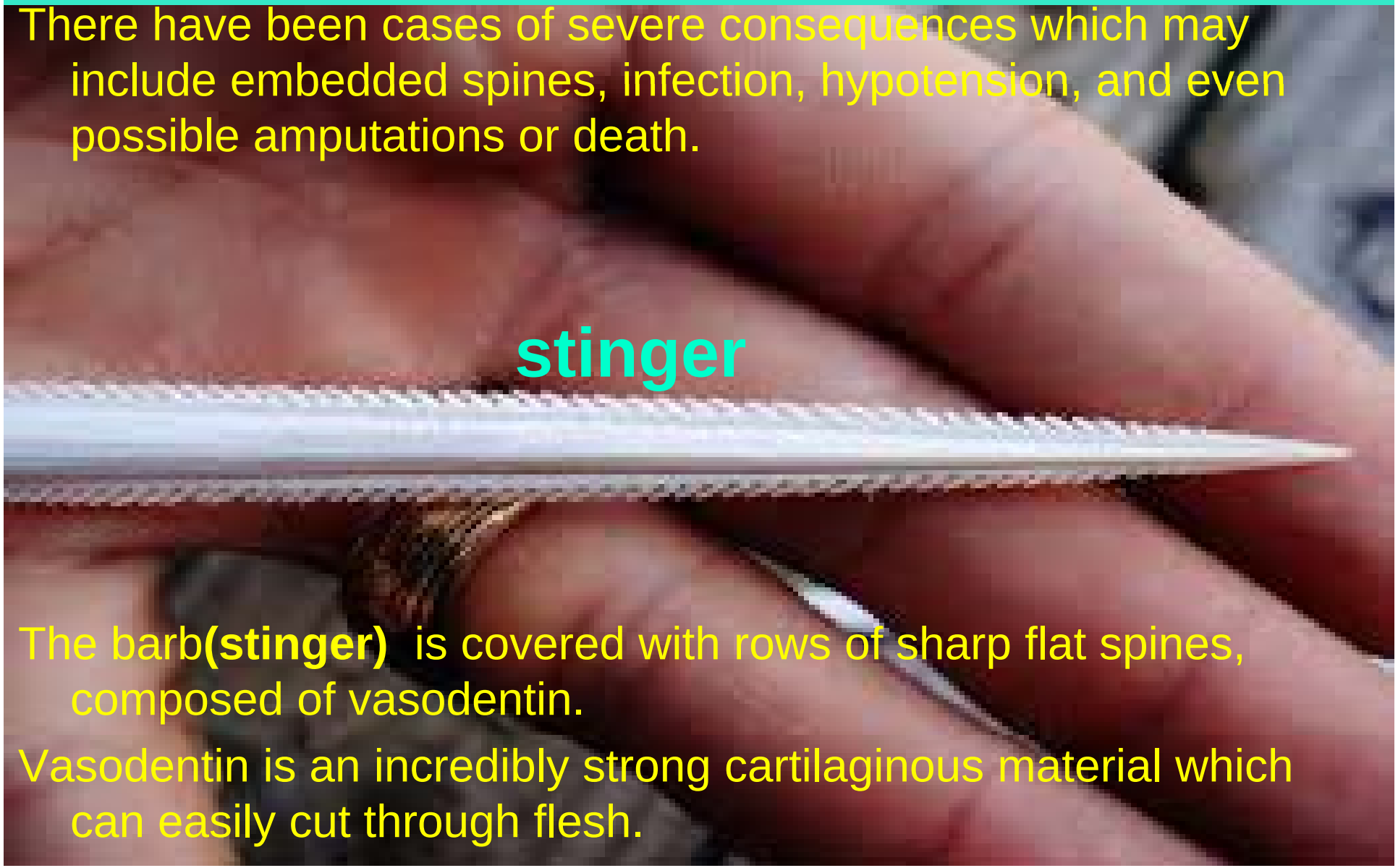
Animals (Active)

- **Jellyfish (**stinging soft gelatinous marine animal)
- **Blue ringed octopus**
- **Platypus**
- **Stingray**
- **Cone snails**


stingray
stinger
1500 sting/year in US
Spine at base of tail with venom gland
Pain, salivation, diarrhea, cramps, dyspnea, headache

Many victims of stingray related injuries suffer from physical effects **including nausea, vomiting, diarrhea, extreme pain at the wound, muscle cramps, and a cut at the puncture** site.

There have been cases of severe consequences which may include embedded spines, infection, hypotension, and even possible amputations or death.



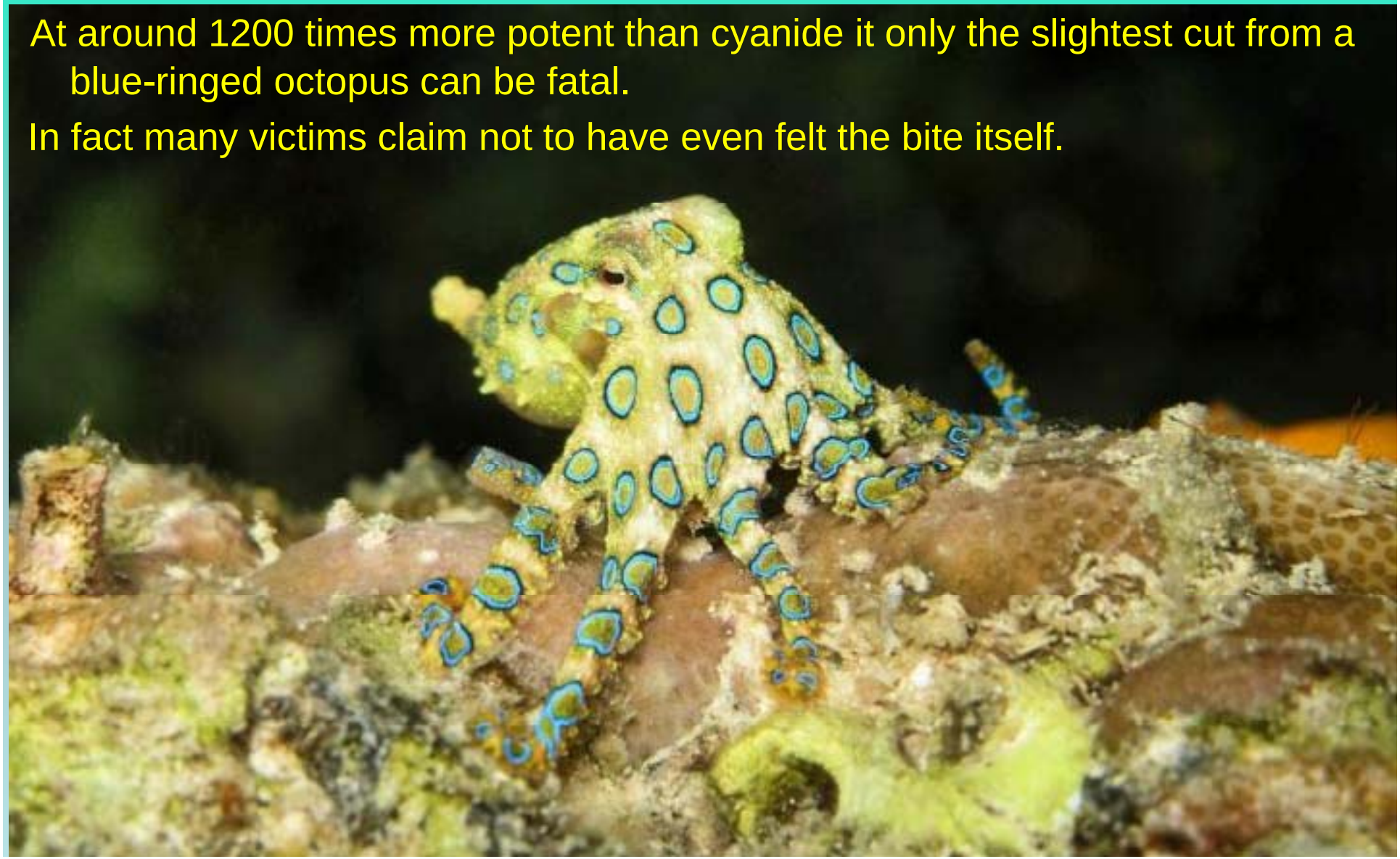
The barb**(stinger)** is covered with rows of sharp flat spines, composed of vasodentin.

Vasodentin is an incredibly strong cartilaginous material which can easily cut through flesh.

Blue Ringed Octopus .Their saliva contains Tetrodotoxin,(neurotoxin) It is said an average specimen weighing around 30g contains enough poison to kill over 10 adults.

At around 1200 times more potent than cyanide it only the slightest cut from a blue-ringed octopus can be fatal.

In fact many victims claim not to have even felt the bite itself.

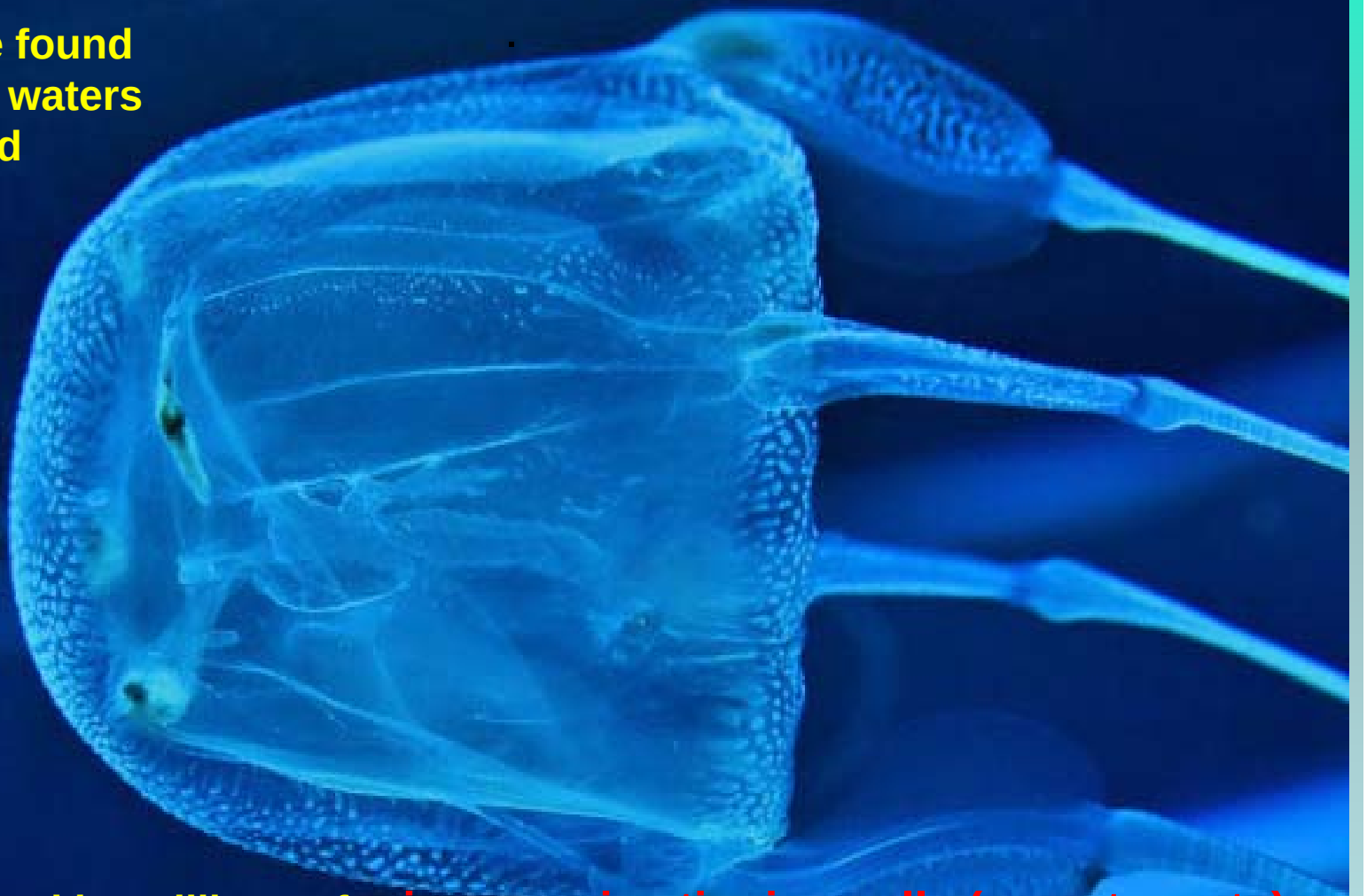


Box Jellyfish ,named for their body shape(sea wasp)

Ratio of stings to fatalities is about 10 to 1

(about 60 deaths in tropical Australia)

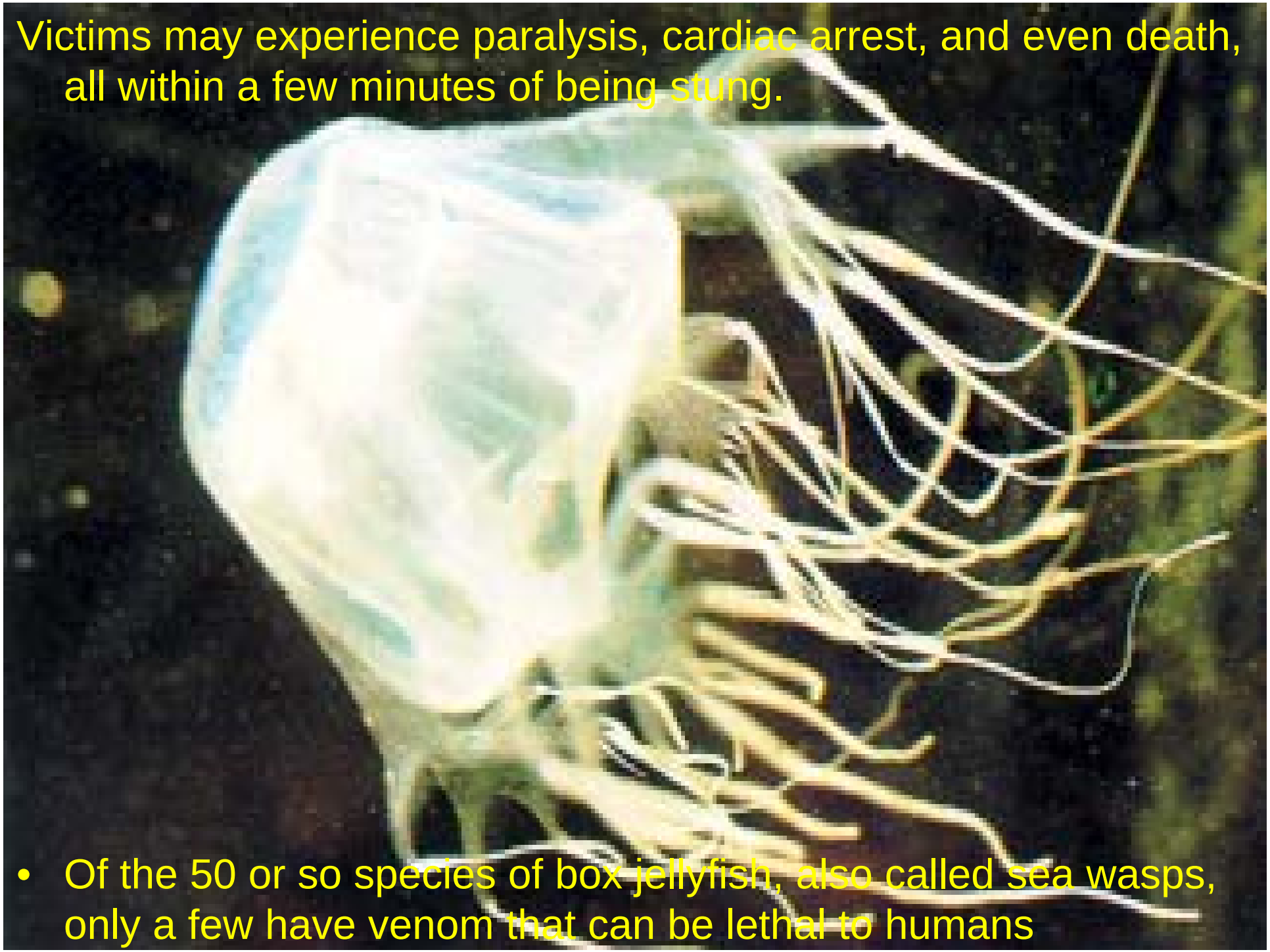
Box jellyfish are found in warm coastal waters around the world



Venom is delivered by millions of microscopic stinging cells (nematocysts).

Mechanism of action of the venom in severe envenomation remains unclear

box jellyfish are found in warm coastal waters around the world



Victims may experience paralysis, cardiac arrest, and even death, all within a few minutes of being stung.

- Of the 50 or so species of box jellyfish, also called sea wasps, only a few have venom that can be lethal to humans

Cone Snail(cigarette snail)

Conotoxin:Neurotoxin venom

A single drop of the cone snail's venom is said to be sufficient to kill 20 men making it one of the most venomous creatures on earth.

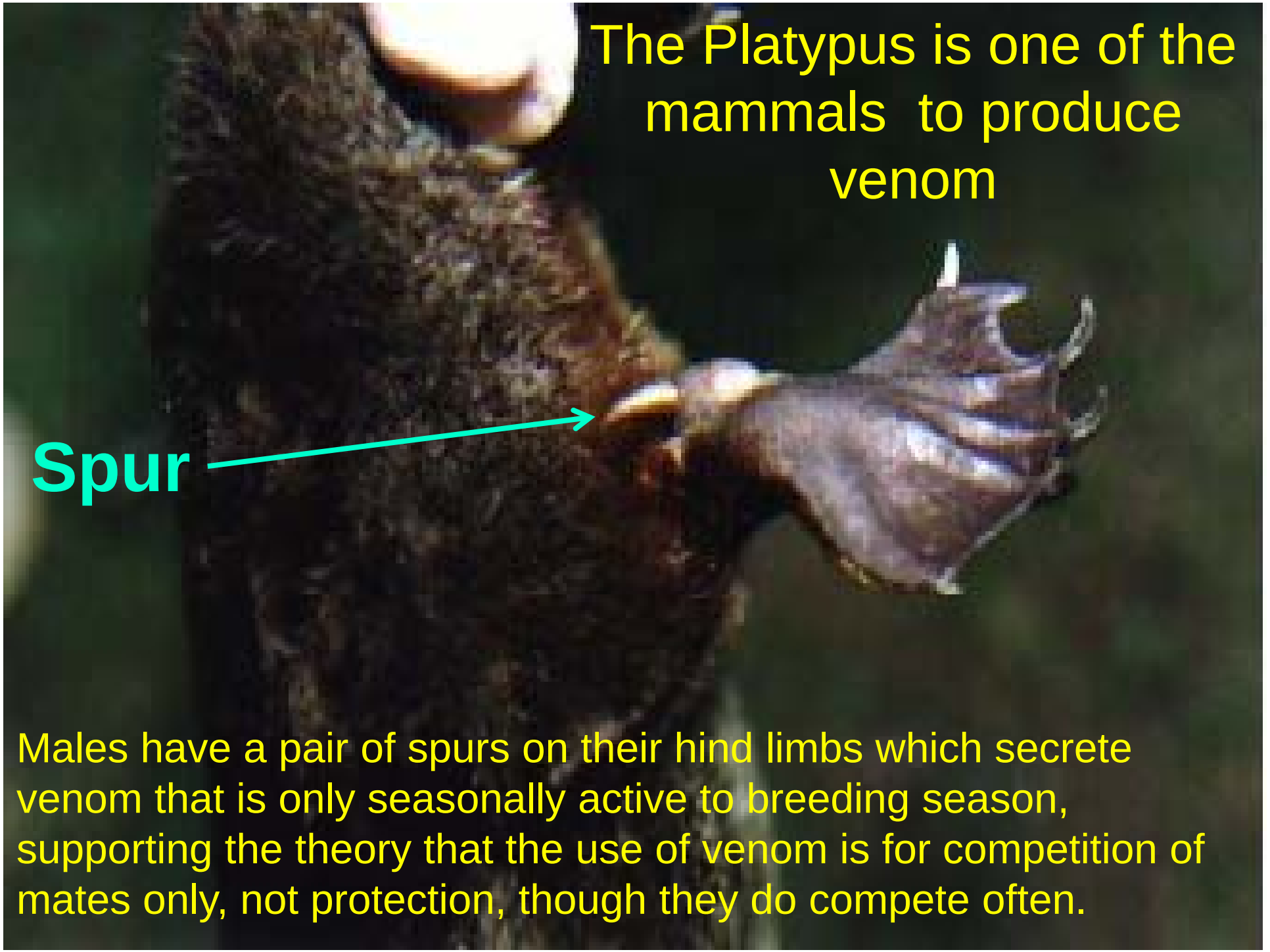
Cone Snail(cigarette snail)

- **These snails are killers! Armed with tiny harpoons**

The stings generally cause intense, localized pain with the life-threatening symptoms sometimes taking several days to present.

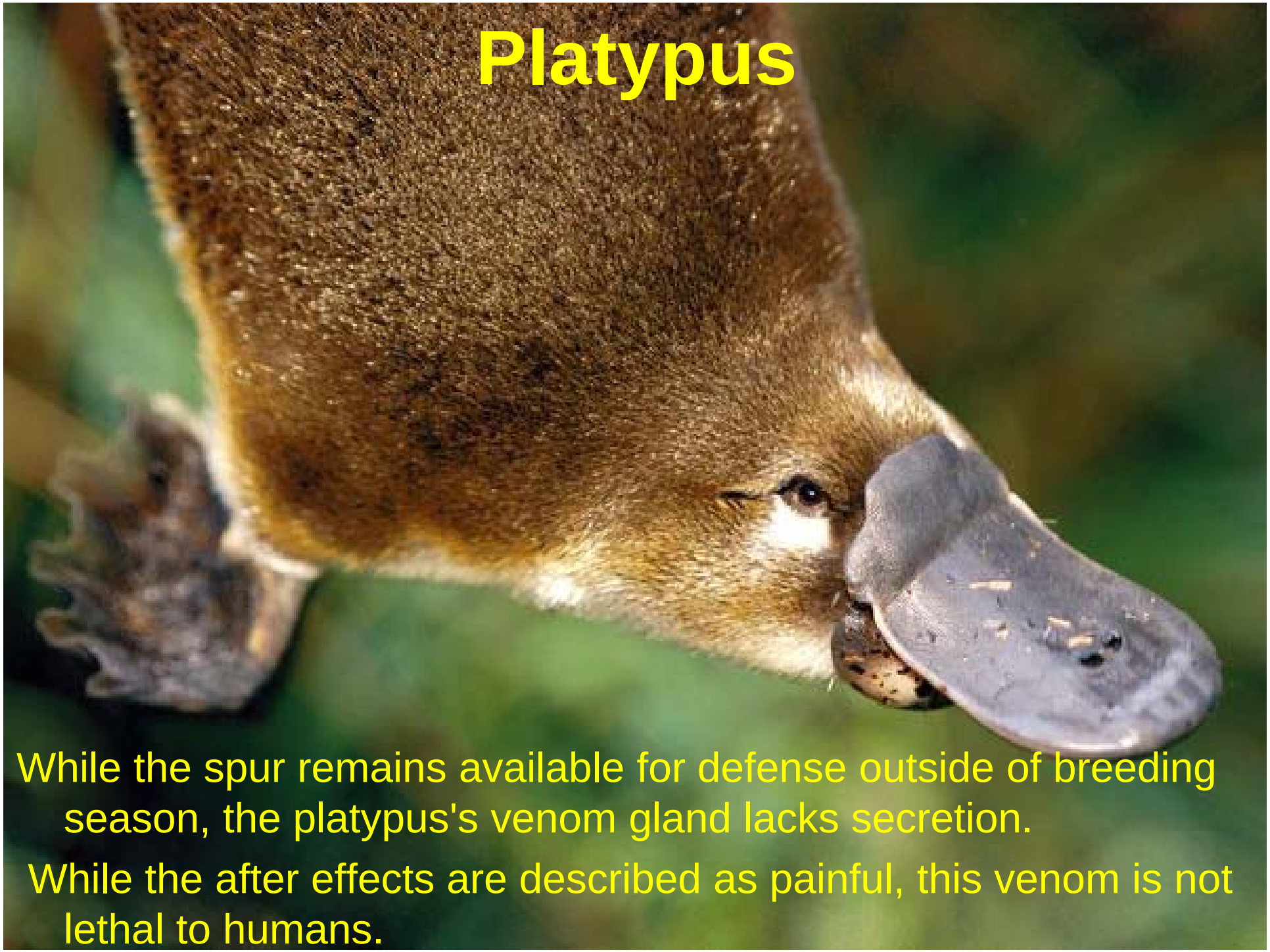
- **Rapid paralysis of the respiratory system and death can occur shortly after the sting.**

- **In fact, one species of cone snail is known locally as the "cigarette snail" on account of there being just enough time to smoke one before you die!**



Males have a pair of spurs on their hind limbs which secrete venom that is only seasonally active to breeding season, supporting the theory that the use of venom is for competition of mates only, not protection, though they do compete often.

Platypus



While the spur remains available for defense outside of breeding season, the platypus's venom gland lacks secretion.

While the after effects are described as painful, this venom is not lethal to humans.

Animals (Passive)

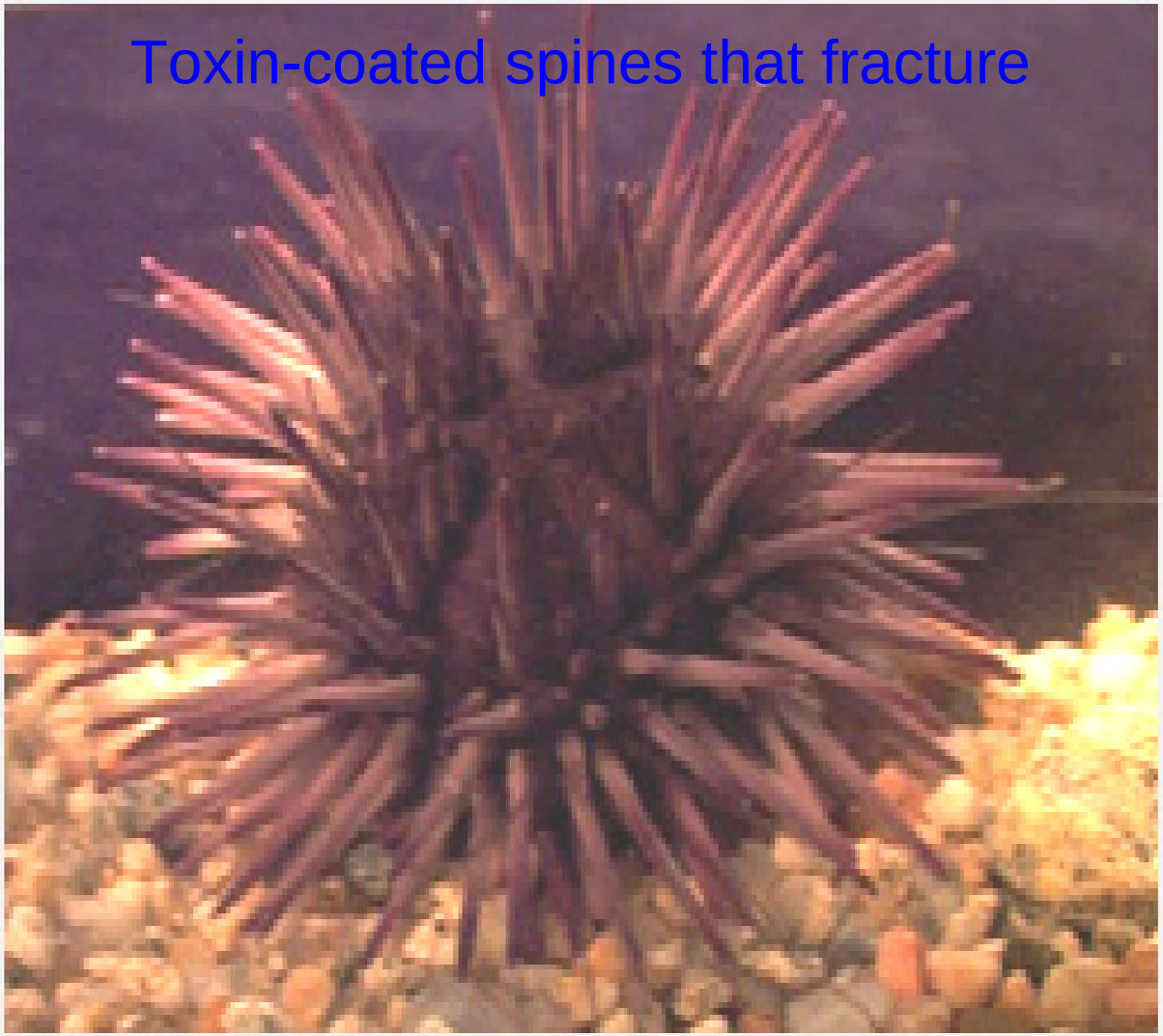
- Stonefish(Tetradotoxin)
- Puffer fish (Tetradotoxin)
- Golden poison frog(Batrachotoxin)
- Cane toads(Bufotoxin)
- Venomous echinoderms:
- Asteroidea, sea stars
- Echinoidea, sea urchins; sea cucumbers)


Stonefish
Possess a specialized delivery apparatus(13 needle-sharp spines along its back
just waiting for some unfortunate person to stand on it)
TTX (Tetrodotoxin) a strong neurotoxin
D.R.D


The stonefish is most venomous fish on the planet.
Just to increase the chance of being walked on the stonefish is capable of surviving out of the sea for up to 24 hours.
• The neurotoxic venom of the stonefish is not only dangerous but unbelievably painful.

- **Venomous echinoderms**
- **Many species of echinoderms (Asteroidea, sea stars; Echinoidea, sea urchins; sea cucumbers) can cause injury to humans, firstly by mechanical trauma from spines, secondly by local envenoming from venom on the spines**

- Symptoms:
  - Pain, burning, discoloration of skin
  - Use acetic acid to dissolve embedded spines
  - Larger spines may require surgical removal




Pufferfish can be lethal if not served properly. Puffer poisoning usually results from ingesting Tetrodotoxin found in the liver, ovaries, intestines and skin of the fish
РОССИЯ 1
ВЕСТИ
ТОКИО, ЯПОНИЯ
The toxin paralyzes diaphragm muscles and stops the person who has ingested it from breathing

Almost all **Pufferfish** contain Tetrodotoxin to humans, is deadly, up to 1,200 times more **poisonous** than cyanide.

There is enough **toxin** in one **pufferfish** to kill 30 adult humans, and there is no known antidote

Golden poison frog

(Batrachotoxin was derived from the Greek word "batrachos" meaning "frog“) the high toxicity of frogs appears to be due to the consumption of small insects and other arthropods(small blister beetle)

The golden toad was a small true toad that was once abundant in a small, area in Coasta Rica.


Cantoad(Bufotoxin), also known as the giant neotropical toad or marine toad, is a large, terrestrial true toad which is native to central America, but has been introduced to various islands throughout Oceania and the Caribbean, as well as northern Australia
Introduced in the 1930s to control sugar cane beetles
Contains a toxin that kills animals that eat it.
Greatest risk to humans is accidental contact of the venom with the eyes, produces severe pain.

Slow loris(primate).Found in Asia(Bangladesh and India,Philippines and China)

The toxin is obtained by licking a gland on their arm, and the secretion is activated by mixing with salvia.

Their toxic bite is a limit to predators, and the toxin is also applied to the fur during grooming as a form of protection for their infants.

The secretion from the arm contains a chemical may be augmented by secondary toxins from the diet in wild individuals


The **hooded pitohui**. A neurotoxin called homobatrachotoxin found in the birds' skin and feathers causes numbness and tingling in those touching the bird.
The **hooded pitohui** use toxin to defend themselves from predators.
The hooded pitohui may acquire its poison from part of its diet, the beetles of the Melyridae family.
hooded pitohui Found in Papua New Guinea

Venomous lizards

- There are some 5000 different species of lizards worldwide and, until a few years ago, **only two** were thought to be venomous.

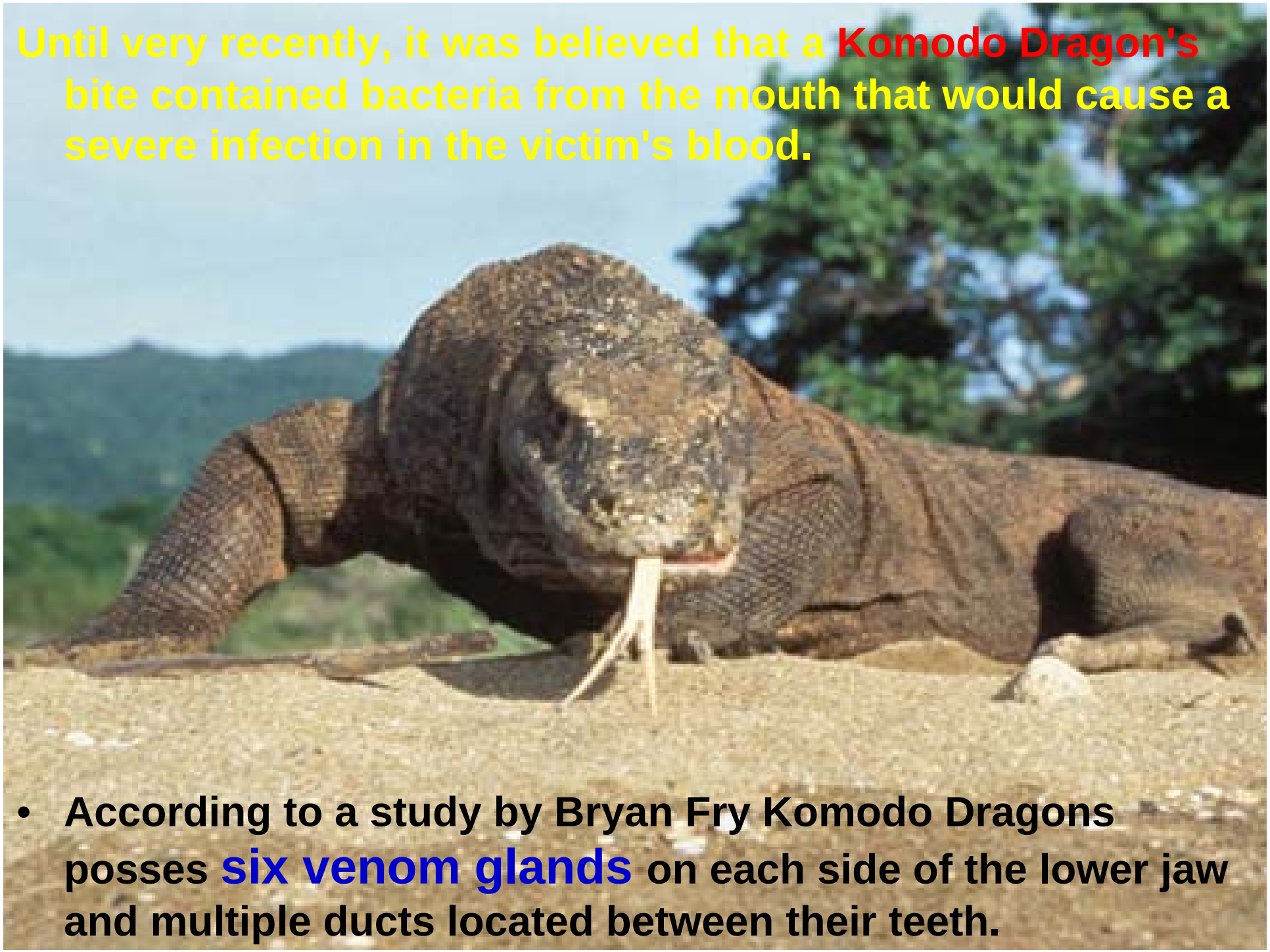
- Scientists, under the leadership of Bryan Fry, have demonstrated that both monitor lizards (commonly kept as pets) and iguanas also produce venom.

- And now
- Nine types of lizard toxins are shared with snakes, but some toxins are new and yet to be investigated for medical research.

- **Two species endemic to the North America**
  - **Mexican Beaded Lizard (Mexico)**
  - **Gila Monster (Southwest US)**
    - **Modified submandibular glands with toxin**
    - **More irritation = more venom injected**
    - **Longer attachment = more envenomation**
    - **Envenomation occurs in <70% of cases**
    - **Same lab evaluation as vipers, no antivenin required**
    - **Local wound care**

Venom glands are located in their lower jaws, unlike snakes' venom glands, which are located in their upper jaws. Also, unlike snakes, helodermatids lack the musculature to inject venom.

Gila Monster (*Heloderma*)


Until very recently, it was believed that a Komodo Dragon's bite contained bacteria from the mouth that would cause a severe infection in the victim's blood.
• According to a study by Bryan Fry Komodo Dragons posses six venom glands on each side of the lower jaw and multiple ducts located between their teeth.


با سپاس از توجه شما
D.R.D