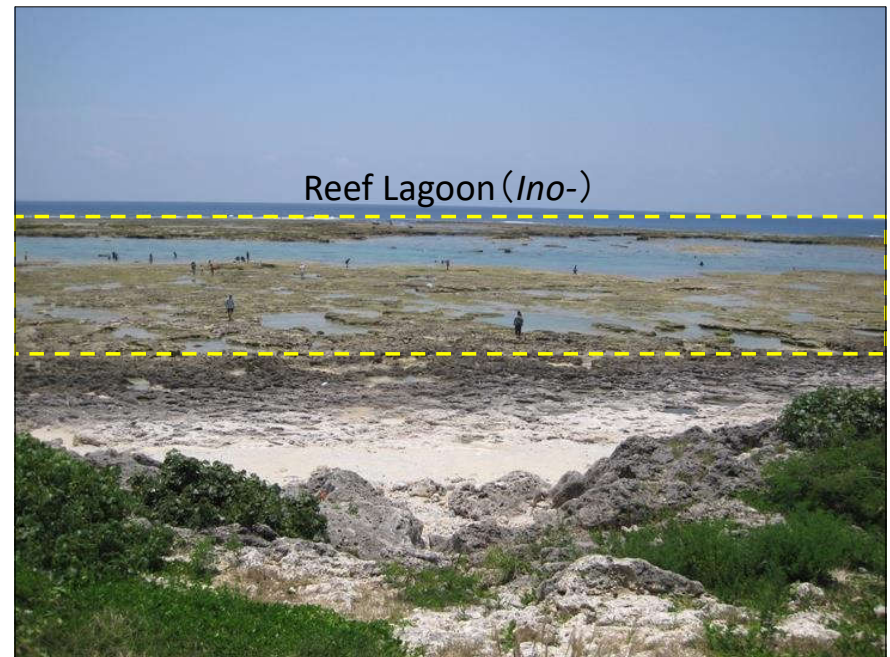
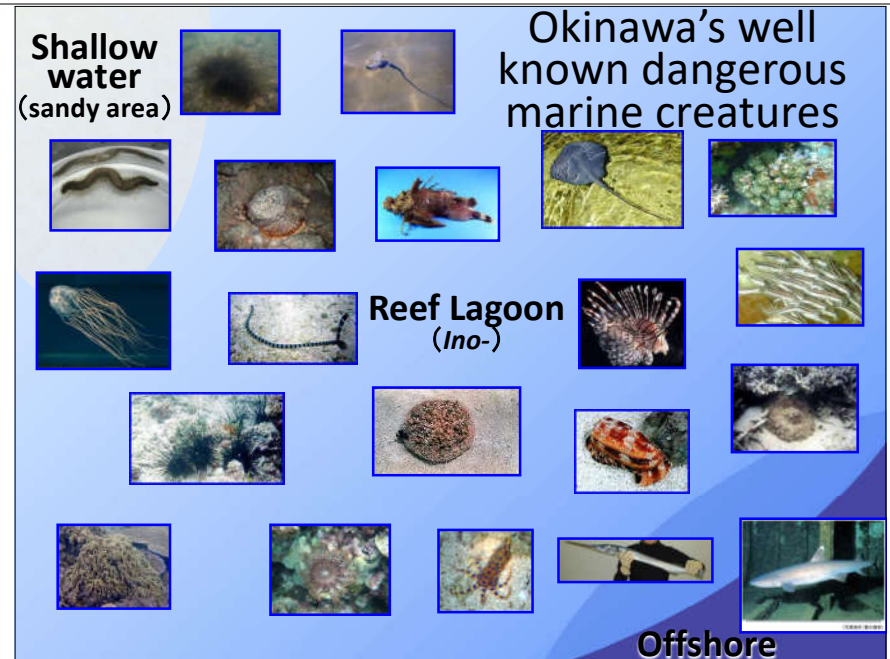


# Overview of Damages and Measures for Box Jellyfishes and other Dangerous Creatures in Okinawa Prefecture

Okinawa Prefectural Institute  
of Health and Environment  
Yoshimune Fukuchi

## Today's Topic

- ① Overview of damages caused by dangerous marine creatures
- ② Types of dangerous marine creatures and their First Aid
- ③ How to prevent damage



## Fatalities from Bites & Stings by Dangerous Marine Creatures in Okinawa

(Includes uncertain cases)

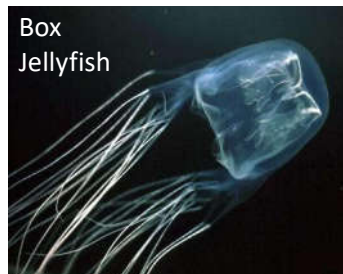
1918~2016  
35 cases reported

|                          | Cases |
|--------------------------|-------|
| Sea Snakes               | 8     |
| Needlefishes             | 8     |
| Sharks                   | 7     |
| Killer Cone Snails       | 6     |
| Box (habu) Jellyfishes   | 3     |
| Devil Stingers           | 2     |
| Crown-of-Thorns Starfish | 1     |

## Fatality Caused by Box Jellyfish

1997  
 Kin-city, age 6, female

1998  
 Ishikagaki-city, age 3, female



Box Jellyfish

## Bites and Stings Accident Investigation

(conducted from 1998)

別紙4-医療機関用  
 = 海洋危険生物刺咬症事故調査票 =

保健所長殿 報告者名 報告日  
 記入日 平成 年 月 日

|  |  |  |   |   |
|--|--|--|---|---|
| 氏名   | 性別   | <input type="checkbox"/> 男 <input type="checkbox"/> 女  | 年齢  | 歳   |
| 住所   | 電話番号   |  |   |   |
| 生年月日   | T・S・H  | 年 月 日  | 職業(又は学級名)   |   |
| 市町村名   | 市・町・村  | 海岸名(ビニ一帯名)   |   |   |
| 発生場所   | 波打ち際より   | m沖   | 水深  | m   |
|  | クワガネット   | <input type="checkbox"/> 有 <input type="checkbox"/> 無 <input type="checkbox"/> 不明  | 季節  | <input type="checkbox"/> 春 <input type="checkbox"/> 夏 <input type="checkbox"/> 秋 <input type="checkbox"/> 冬 |
| 発生日時   | 平成 年 月 日   | <input type="checkbox"/> 午前 <input type="checkbox"/> 午後  | 時   | 分   |
| 被害者名   | <input type="checkbox"/> 見た <input type="checkbox"/> 見ていない   | 生体名  | <input type="checkbox"/> 見い <input type="checkbox"/> 不明 |   |
| 被害時の行動   | <input type="checkbox"/> 遊泳 <input type="checkbox"/> 魚釣り <input type="checkbox"/> スキューバ(潜水)  | <input type="checkbox"/> 潮干狩り  | <input type="checkbox"/> 漁労中                            |   |
|  | <input type="checkbox"/> 不輸 <input type="checkbox"/> その他( )  |  |   |   |
| 被害現場での対応   | <input type="checkbox"/> した <input type="checkbox"/> しない <input type="checkbox"/> 不明   |  |   |   |
| 処置方法   | <input type="checkbox"/> 食酢 <input type="checkbox"/> 消毒 <input type="checkbox"/> 吸引 <input type="checkbox"/> 緊縛 <input type="checkbox"/> 温湯浴置 <input type="checkbox"/> コールドパック |  |   |   |
| 処置部位   | 痛程度  | <input type="checkbox"/> 軽症 <input type="checkbox"/> 中等症 <input type="checkbox"/> 重症 <input type="checkbox"/> 死亡 <input type="checkbox"/> 不明                                       |   |   |
|  | 症状   | <input type="checkbox"/> かゆみ <input type="checkbox"/> 腫み <input type="checkbox"/> 発熱 <input type="checkbox"/> 腫脹 <input type="checkbox"/> 不明 <input type="checkbox"/> その他( )       |   |   |
|  | 別名   | <input type="checkbox"/> 刺刺刺(刺口、唇、静) <input type="checkbox"/> 抗生刺(刺口、唇、静、塗布) <input type="checkbox"/> 20分刺(刺口、唇、静、塗布) <input type="checkbox"/> 痛刺法 <input type="checkbox"/> その他( ) |   |   |
| 受診までの時間  | <input type="checkbox"/> 30分未満 <input type="checkbox"/> 1時間未満 <input type="checkbox"/> 2時間未満 <input type="checkbox"/> 6時間未満  |  |   |   |
|  | <input type="checkbox"/> 12時間未満 <input type="checkbox"/> 2日未満 <input type="checkbox"/> 2日以上 <input type="checkbox"/> 不明  |  |   |   |
| 入院   | <input type="checkbox"/> 有( 日) <input type="checkbox"/> 無  | 写真撮影(有無)   | <input type="checkbox"/> 有 <input type="checkbox"/> 無   |   |
| 被害者は、海洋危険生物のポスターを見たことがありますか? <input type="checkbox"/> 有 <input type="checkbox"/> 無 |  |  |   |   |
| 被害者は、海洋危険生物の知識はありますか? <input type="checkbox"/> 有 <input type="checkbox"/> 無        |  |  |   |   |

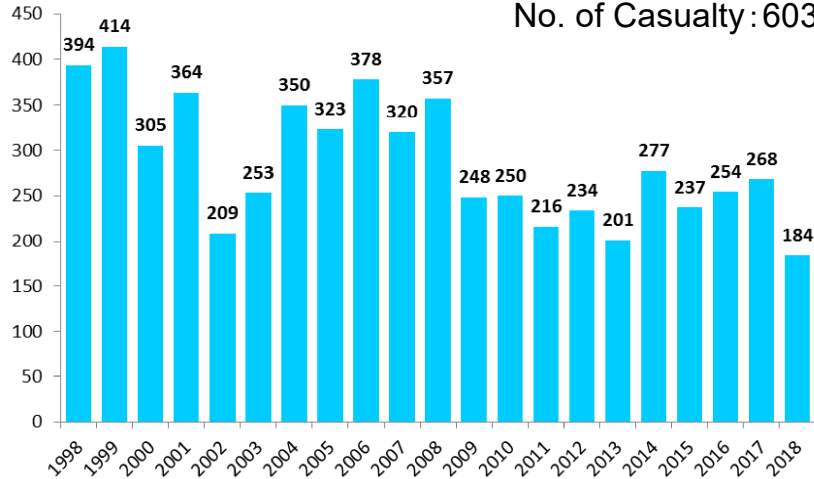
\*この調査票は、保健所長に提出してください。

## Overview of Damages Caused by Dangerous Marine Creatures

## Yearly Damage Occurrence Statistics

(1998~2018)

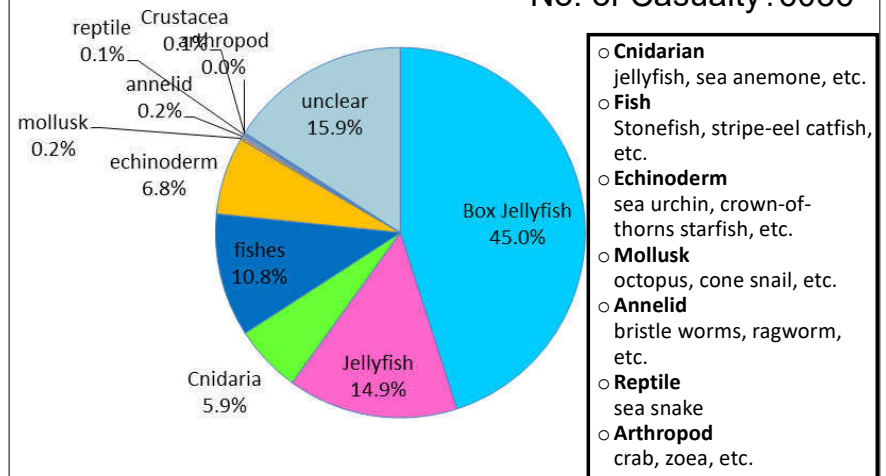
No. of Casualty : 6036



## Damage Occurrence based on Specific Dangerous Creature

(1998~2018)

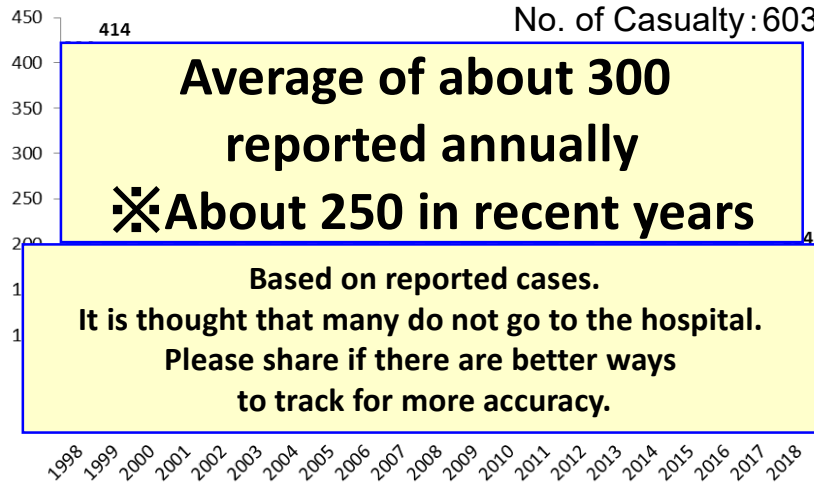
No. of Casualty : 6036



## Yearly Damage Occurrence Statistics

(1998~2018)

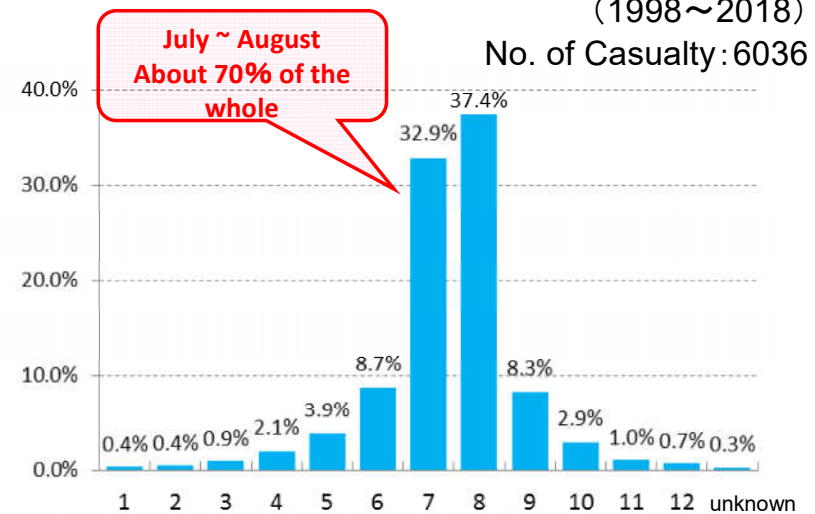
No. of Casualty : 6036



## Monthly Damage Occurrence Statistics

(1998~2018)

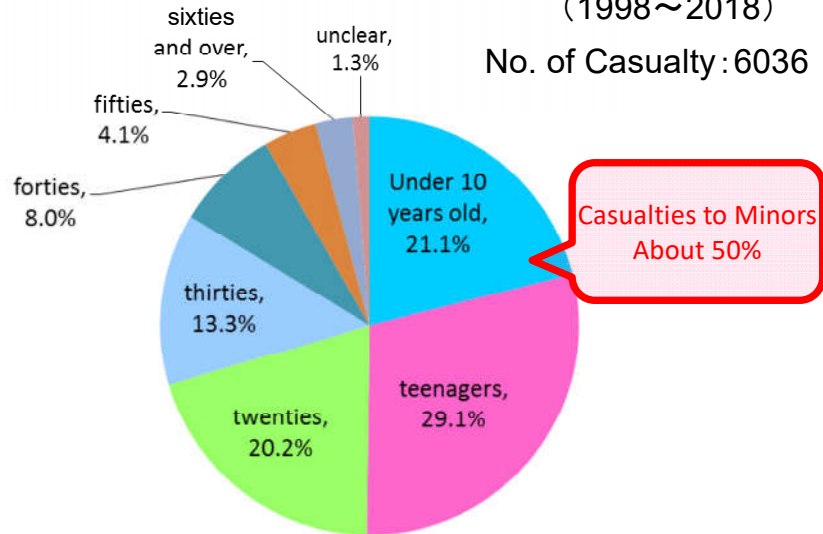
No. of Casualty : 6036



## Damage Occurrence based on Age

(1998~2018)

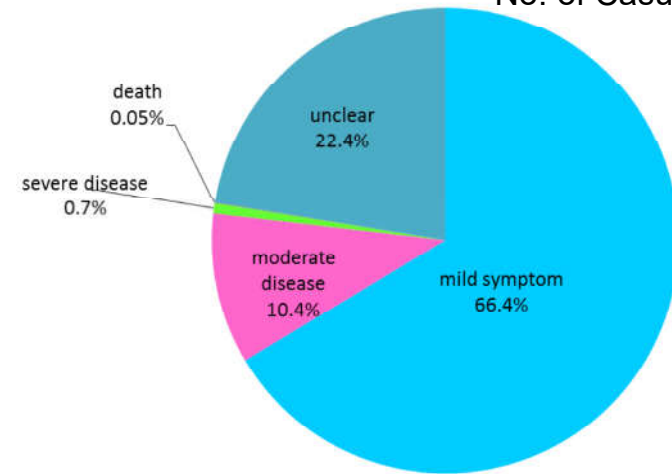
No. of Casualty : 6036



## Damage Occurrence based on Severity

(1998~2018)

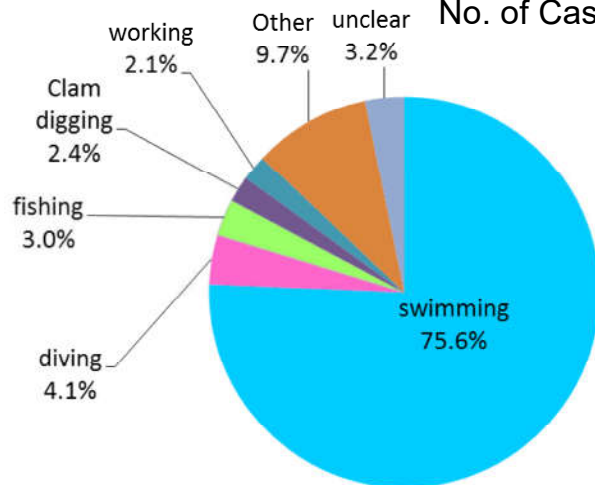
No. of Casualty : 6036



## Damage Occurrence based on Activity

(1998~2018)

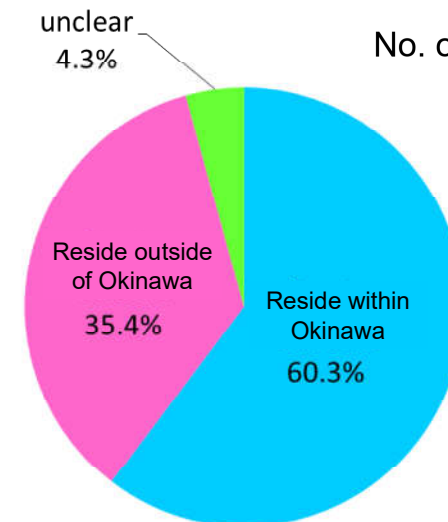
No. of Casualty : 6036



## Damage based on Residence

(1998~2018)

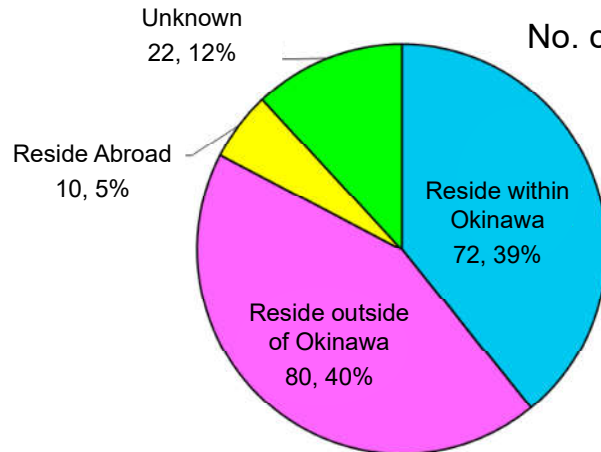
No. of Casualty : 6036



## Damage based on Residence

(2018)

No. of Casualty: 184

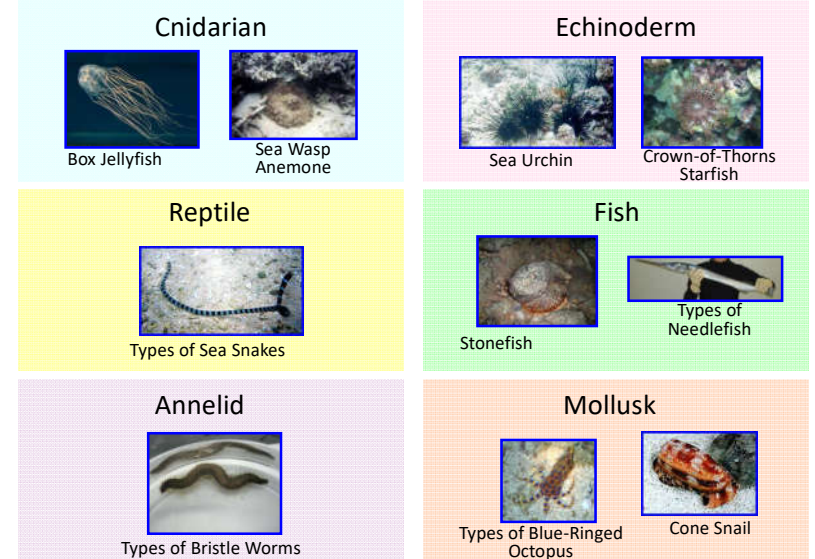


## Types of Dangerous Marine Creatures and their First Aid







## Actual Conditions of Damage

- Average of **about 300 cases** reported annually
- Often caused by **Box Jellyfish**
- Frequent during the **summer**
- **Ages 10 and younger are more prevalent**
  - ⇒ easily become severe
- **Increasing in non-Okinawa residents**
  - ⇒ many are tourists

## Types of Dangerous Marine Creatures

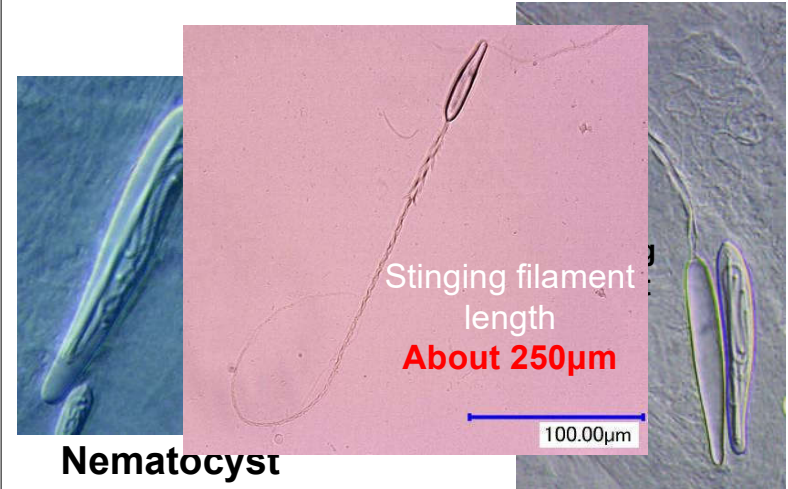


## Types of Dangerous Marine Creatures

|  |   |
|--|---|
| <p><b>Cnidarian</b></p>  <p>Box Jellyfish      Sea Wasp Anemone</p> | <p><b>Echinoderm</b></p>  <p>Sea Urchin      Crown-of-Thorns Starfish</p>  |
| <p><b>Reptile</b></p>  <p>Types of Sea Snakes</p>                   | <p><b>Fish</b></p>  <p>Stonefish      Types of Needlefish</p>              |
| <p><b>Annelid</b></p>  <p>Types of Bristle Worms</p>                | <p><b>Mollusk</b></p>  <p>Types of Blue-Ringed Octopus      Cone Snail</p> |

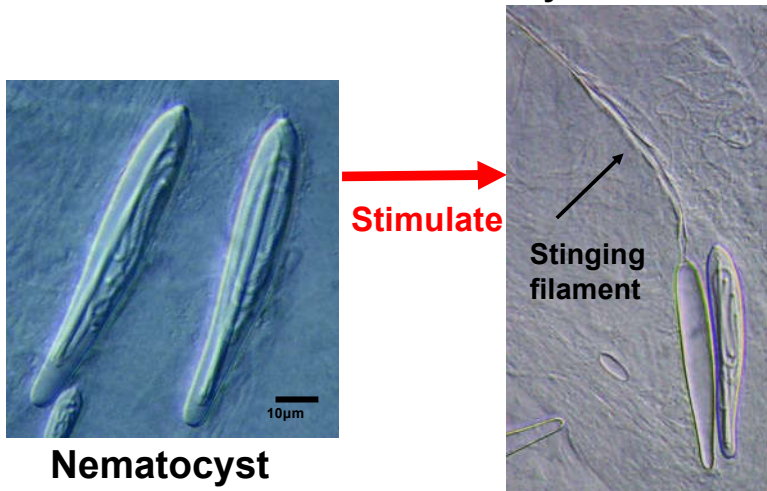
## What is Cnidarian?

- All Cnidarians have Nematocyst



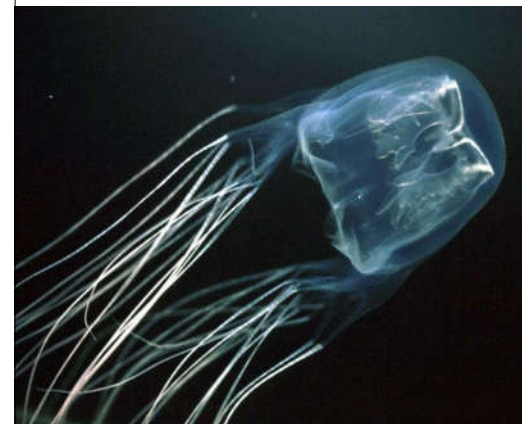
## What is Cnidarian?

- All Cnidarians have Nematocyst



## Box Jellyfish

(*Chironex yamaguchii*)



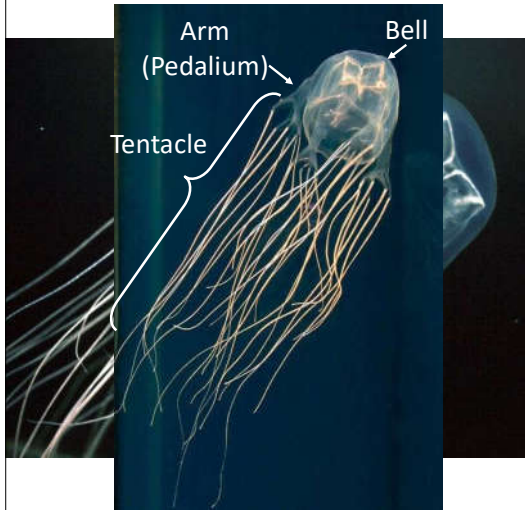
**Distribution:** throughout Okinawa Prefecture (domestically, only in Okinawa)

**Characteristics:**

- Cube shaped bell, **maximum size of 13cm**
- 4 arms each with 7 tentacles, total of 28 tentacles, length of **more than 150cm**
- Seen in Okinawa from **May through October**
- Difficult to find **underwater**

# Box Jellyfish

(*Chironex yamaguchii*)



**Distribution :** throughout  
**Okinawa Prefecture**  
(domestically, only in Okinawa)

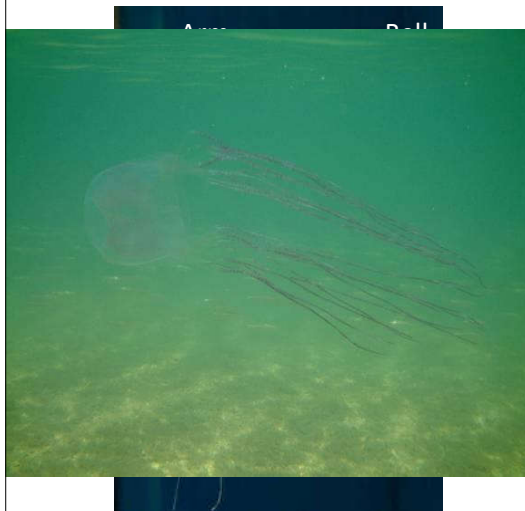
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# Box Jellyfish

(*Chironex yamaguchii*)

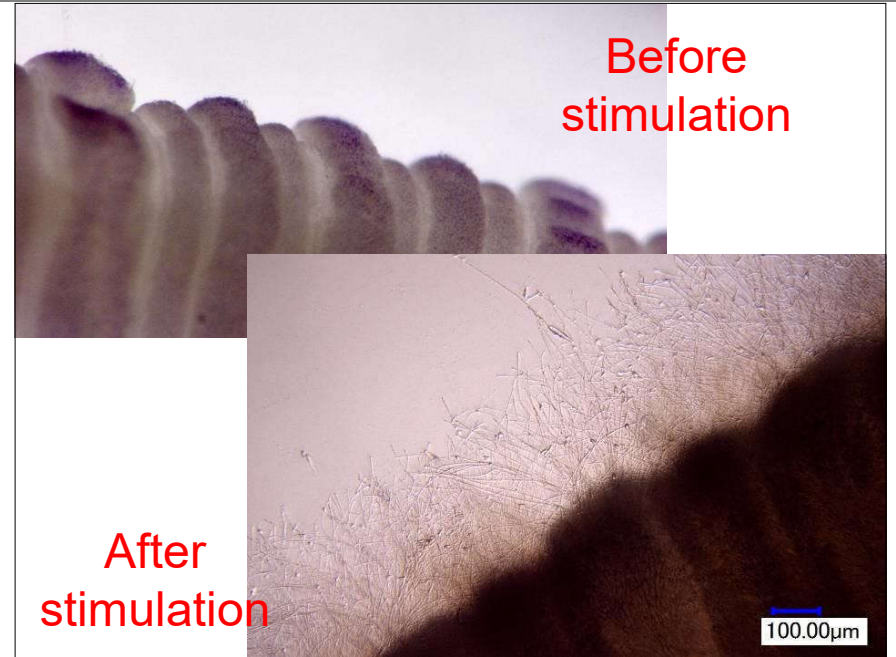
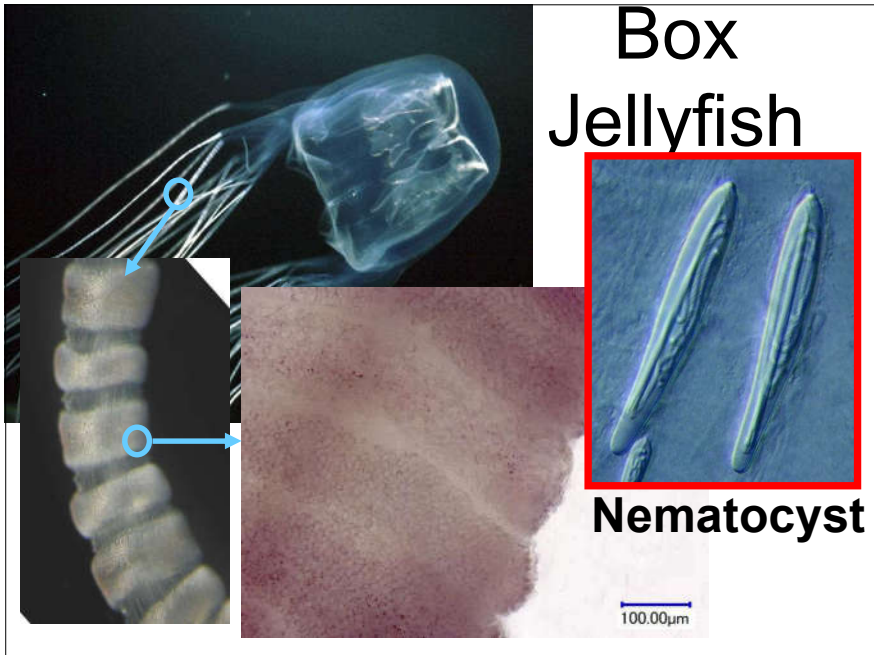


**Distribution :** throughout  
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(domestically, only in Okinawa)

**Characteristics:**

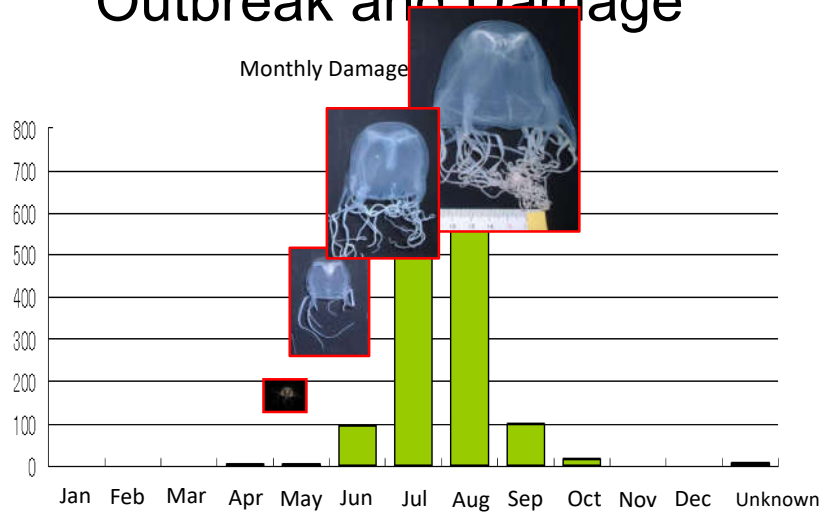
- Cube shaped bell, **maximum size of 13cm**
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- Seen in Okinawa from May through October
- Difficult to find underwater







# Box Jellyfish Outbreak and Damage



## Box Jellyfish Stings - Symptoms -

Immediately after injury



**Local Symptoms**  
Welt Blister Skin Necrosis

**Systemic Symptoms**  
Respiratory depression  
Shock symptoms such as drop in blood pressure



Okinawa Prefectural Chubu Hospital, Dermatologist Dr. Hironobu Sato  
(University of the Ryukyus School of Medicine, Professor Hiroshi Uezato)

## Characteristics of Severe and Fatal Cases Caused by Box Jellyfish

|   | Age | Injured Site                             | Tentacle Removal Method  | Cardiopulmonary Arrest | CPR* | Result |
|---|-----|--|--|------------------------|------|--------|
| A | 2   | Buttocks, both lower limbs               | Peeled off   | +                      | ○    | Living |
| B | 8   | Both lower limbs                         | Removed with vinegar (stopped breathing before applying vinegar) | +                      | ○    | Living |
| C | 10  | Left thigh                               | Peeled off   | +                      | ○    | Living |
| D | 8   | Abdomen, both legs                       | Peeled off   | +                      | ○    | Living |
| E | 8   | Lower limbs, trunk                       | Scraped off with sand  | Breathing              |      |        |
| F | 5   | Right forearm, upper left leg, both legs | Peeled off   | +                      | ○    | Living |
| G | 14  | Lower abdomen~both legs                  | Unknown  | +                      | ×    | Dead   |
| H | 6   | Left thigh, left hand                    | Rubbed with sand   | +                      | △    | Dead   |
| I | 3   | Both legs                                | Peeled off   | +                      | △    | Dead   |

Reference: Okinawa Chubu Central Hospital

\* ○: Spontaneous breathing after CPR  
△: No spontaneous breathing after CPR  
×: No CPR

## Characteristics of Severe and Fatal Cases Caused by Box Jellyfish

|   | Age   | Injured Site               | Tentacle Removal Method | Cardiopulmonary Arrest | CPR* | Result |
|---|---|----------------------------|-------------------------|------------------------|------|--------|
| A | 2   | Buttocks, both lower limbs | Peeled off              | +                      | ○    | Living |
| B |   |                            | Removed with vinegar    |                        |      |        |
| C | <p>There are many more severe cases (hospitalization, etc.) than what are reported here.</p> <p>Most of the victims are minors.</p> |                            |                         |                        |      |        |
| D |   |                            |                         |                        |      |        |
| E |   |                            |                         |                        |      |        |
| F |   |                            |                         |                        |      |        |
| G |   | legs                       |                         |                        |      | Dead   |
| H | 6   | Left thigh, left hand      | Rubbed with sand        | +                      | △    | Dead   |
| I | 3   | Both legs                  | Peeled off              | +                      | △    | Dead   |

\* ○: Spontaneous breathing after CPR  
 △: No spontaneous breathing after CPR  
 ×: No CPR

Reference: Okinawa Chubu Central Hospital

## Case Caused by Box Jellyfish Sting (likely)

Date/time of occurrence: July 21, 2013, 3PM

Victim: Okinawa resident, **age 8**, female

Location: Coastline in Motobu-city, 3m from shore, **1.5m water depth** on sandy area

Injured body parts: **right thigh, left thigh**

Organism: **Box Jellyfish (likely)**

Situation at the time of injury: Got stung while playing in water. Went to the hospital by ambulance.

**Used vinegar after removing tentacles**

Symptoms: pain, swelling, hyperpnea (chronic)

Course: 3 days of hospitalization (in wheelchair during hospitalization). Continued treatment at the hospital even after 23 days (at the time of survey)



## Case Caused by Box Jellyfish Sting (likely)

- According to the parents, they have previously visited this beach several times, but was the first time getting stung by Box Jellyfish  
 ⇒ **Can occur at places where there are no history of sting incidents**



Figure 1. Location of sting incident

- Following are potential reasons for this case to become severe
    - ① Victim is a **minor, below age 15** ⇒ body is small, significant impact by poison
    - ② **Extensive sting site**
    - ③ **Did not use vinegar** when removing tentacles
- } Large amount of poison injected

## Pay extra attention to harm on children!!

Children's **bodies are small**



**Major impact by poison**



**Easily become severe**



## Fatality Caused by Box Jellyfish Sting

Date/time of occurrence: July 1998, 11:30, coastline in Okinawa

Victim: age 3, female

Situation:

- 5m from water's edge, while playing in **50cm water depth**, stung from **right thigh to toes** (suddenly cries)
- Removed tentacles, poured **carbonated drinks and beer** (did not use vinegar)
- Later, **convulsed** and weakened. Performed **CPR** while driving to hospital and called 119. Transferred to ambulance and went to hospital (**cardiopulmonary arrest, cyanosis** → artificial respiration, chest compression)
- Arrived to hospital at 12:04  
Cardiopulmonary arrest, pupil dilation, cardiopulmonary resuscitation → no response (12:35 confirmed **dead**)



Provided by Yaeyama Police

## Damage Caused by Box Jellyfish — Summary —

- Outbreak from **May ~ October**
- Damage outbreak **almost every part of Okinawa Prefecture**
- **Largely affect age 10 and younger**
- Peak of damage occurrence is from **end of July through mid August**
- Often get stung **multiple times** around **lower limbs**

## Characteristics of Severe Sting Case by Box Jellyfish

- Minor (age 15 and under)
- Extensive sting site
- Incorrect First Aid
- Heart stops within few minutes  
(**Resuscitation makes a difference between life and death**)



## First Aid (Box Jellyfish)



- ① Get out from water
- ② Pour **vinegar** (Concentration of 5%)
- ③ Gently remove tentacles
- ④ **Chill** (minimizes pain)
- ⑤ Go to the hospital

\* If breathing or heart stops, immediately perform artificial respiration, chest compression, and take to hospital



# Effect of Vinegar

Suppresses stimulation of Nematocyst

↓  
Damage does not spread

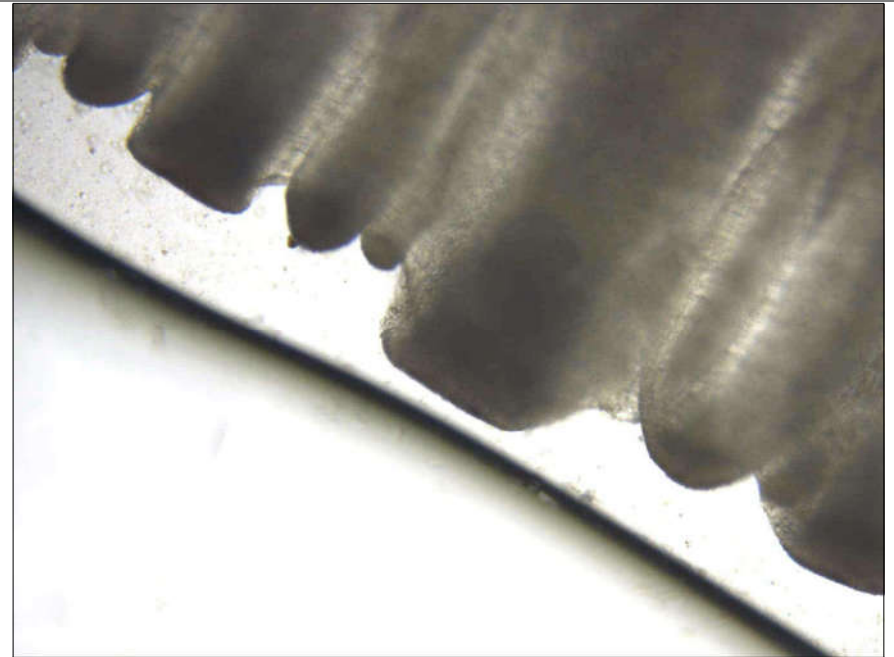
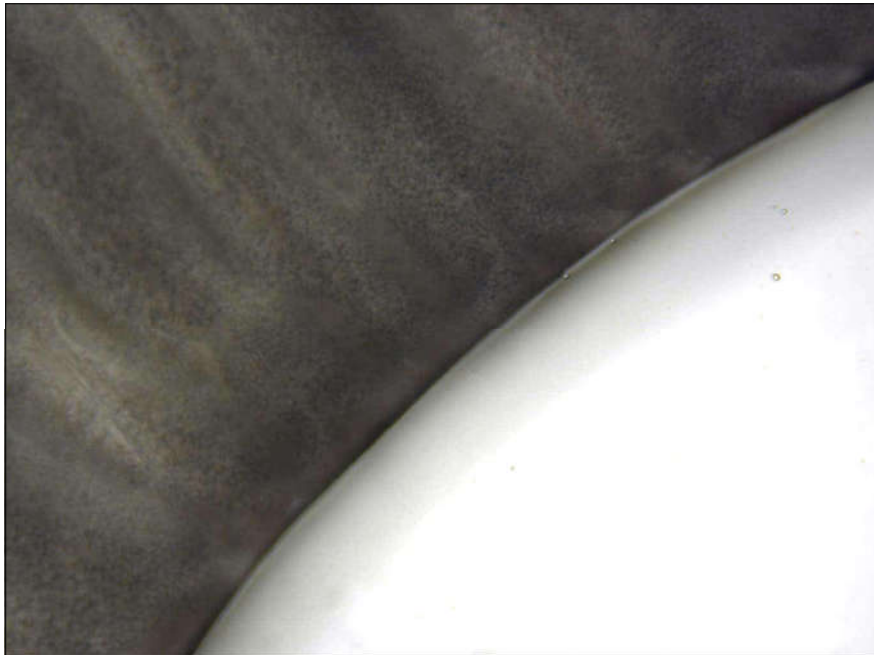
- Mechanism of vinegar suppressing Nematocyst is unknown
- High concentration of vinegar will stimulate Nematocyst; concentration should be around 5%

~~Neutralize poison~~

~~Remove pain~~

~~Alcohol~~

~~Spreads damage~~



## Do Not Rub!!

Tentacles have un-discharged nematocyst



Rubbing will stimulate nematocyst



Stimulated **nematocyst discharges**



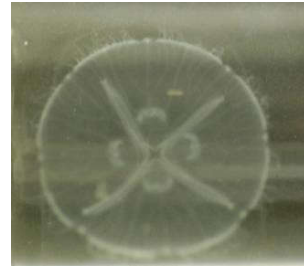
**Increase amount of injected poison**



Nematocyst

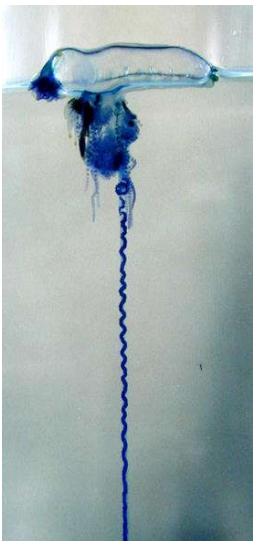
# Other Jellyfishes

## Other Types of Jellyfishes



Some people may get symptoms from Jellyfishes that are considered harmless

## Portuguese Man-of-War



- Strong winds can push large amounts onto the shore
- Be aware because they can be found on sandy beaches
- Fatalities reported abroad

## Other Types of Cnidarian



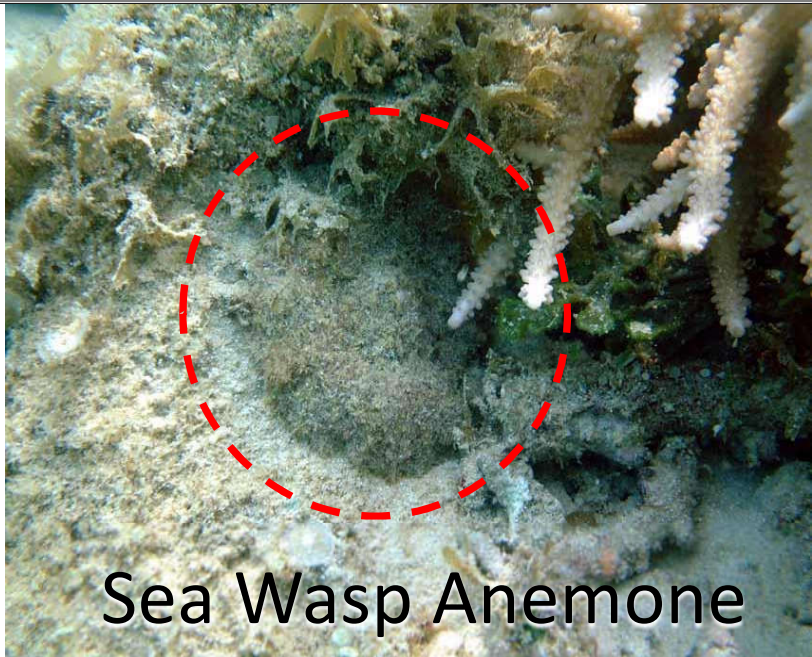
Sea Wasp Anemone



Fire Coral



*Stephanoscyphus racemosus*  
(Iramo)



## Sea Wasp Anemone

Diameter 15~25cm, Brown  
Habitat: reefs, etc.

Period: all year round

Damage

- While swimming, snorkeling, gathering shells/clams, diving
- Period: around July ~ August
- Looks like seaweed, **get stung without noticing**
- **Easily get severe**



## Sea Wasp Anemone



## Sea Wasp Anemone



Nematocyst Sphere



Vinegar



Nematocyst discharged



### Symptoms

- Severe pain, swelling
- Nausea, vomiting
- Peripheral circulatory failure at the injured site
- Tissue necrosis
- **Acute renal failure**

## Other Dangerous Sea Anemone



## *S. racemosum* (Iramo)



↓ vinegar



## *S. Racemosum* (Iramo)



## Fire Coral



## First Aid

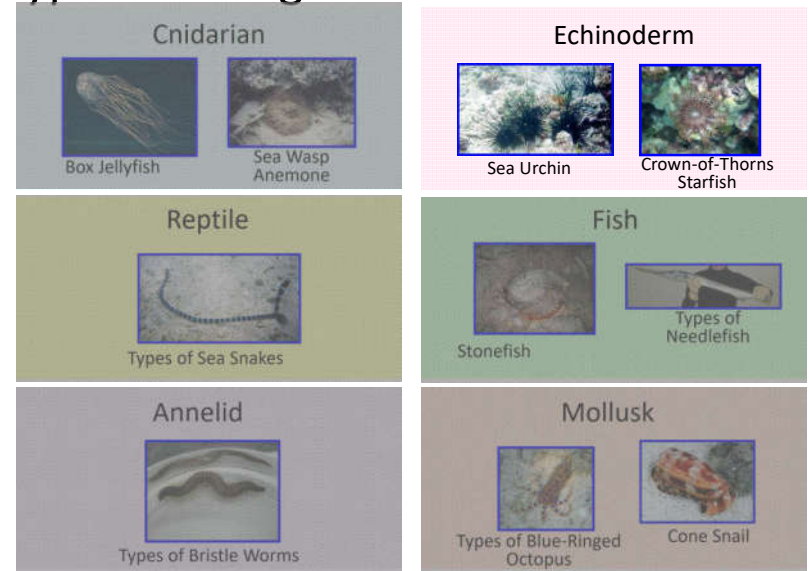
(Cnidarians other than Box Jellyfish)

- ① Get out from water
- ② Wash nematocyst sphere and tentacles with **sea water** (**don't use vinegar**)
- ③ **Chill**
- ④ Go to the hospital



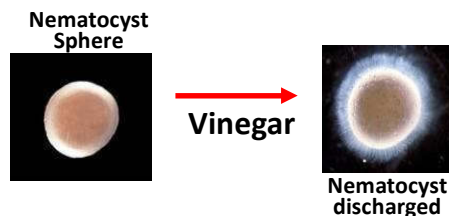
\* Getting stung by Sea Wasp Anemone can easily become **severe**, so go to the hospital

## Types of Dangerous Marine Creatures



## Using Vinegar is Dangerous, Other than on Box Jellyfish

- Discharge nematocyst by vinegar (**Sea Wasp Anemone, *S. racemosum*, etc.**)
- Vinegar's effect unknown (**Portuguese Man-of-War**)



May worsen condition

## Echinoderm



### Crown-of-Thorns Starfish

Distribution: Southwestern islands, Kyushu, Honshu where there are reefs

Period: all year round

Harm: all year round (especially May ~ October)

**especially while diving**

### Long-Spined Sea Urchin

Distribution: shallow rocky areas of the tropics/subtropics

**Spines are brittle**

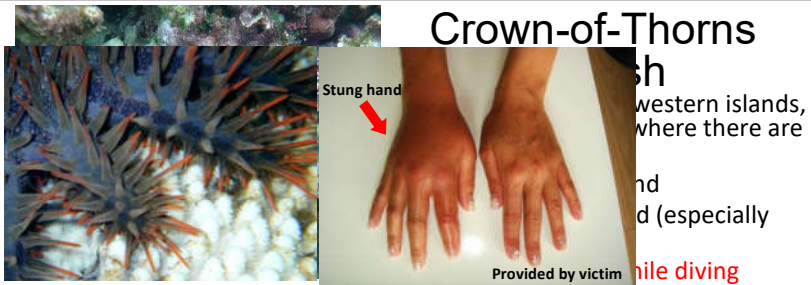
Period: all year round

Harm: especially during July and August while swimming





## Echinoderm



## Long-Spined Sea Urchin







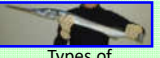



Distribution: shallow rocky areas of the tropics/subtropics  
 Spines are brittle  
 Period: all year round  
 Harm: especially during July and August while swimming

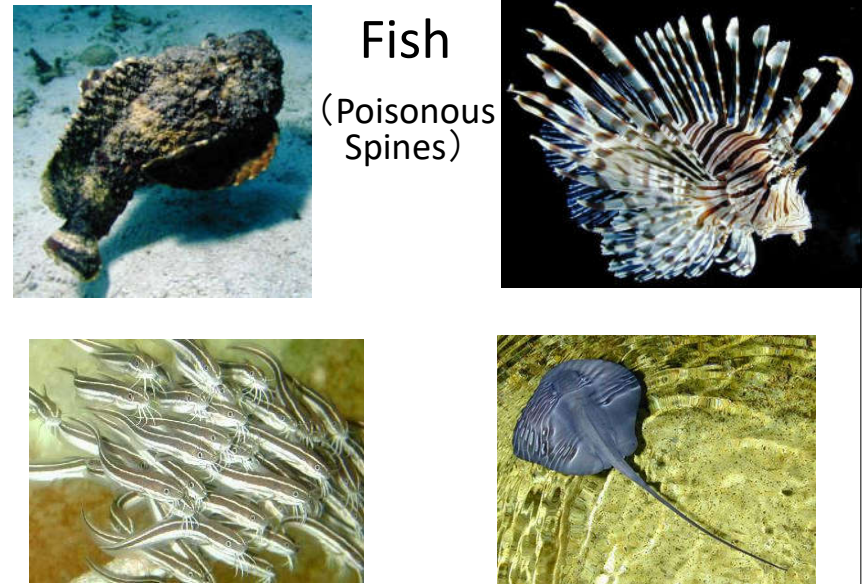


## Flower Urchin



## Types of Dangerous Marine Creatures

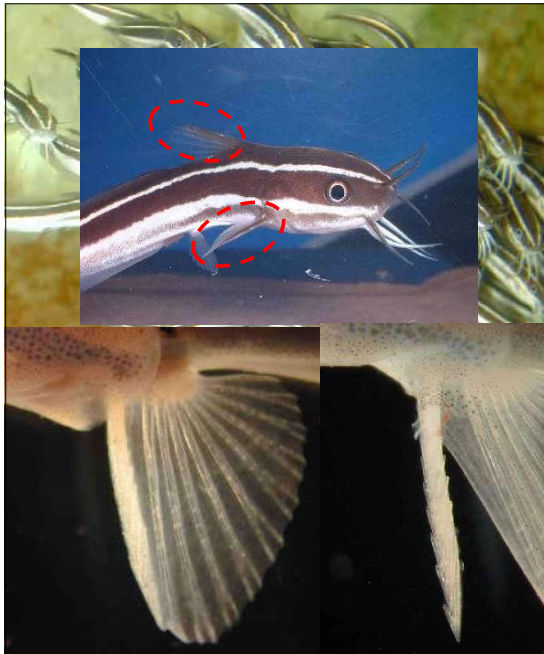
|  |   |
|--|---|
| <p><b>Cnidarian</b></p>  <p>Box Jellyfish</p>  <p>Sea Wasp Anemone</p> | <p><b>Echinoderm</b></p>  <p>Sea Urchin</p>  <p>Crown-of-Thorns Starfish</p>  |
| <p><b>Reptile</b></p>  <p>Types of Sea Snakes</p>   | <p><b>Fish</b></p>  <p>Stonefish</p>  <p>Types of Needlefish</p>              |
| <p><b>Annelid</b></p>  <p>Types of Bristle Worms</p>  | <p><b>Mollusk</b></p>  <p>Types of Blue-Ringed Octopus</p>  <p>Cone Snail</p> |





## Stripe-Eel Catfish

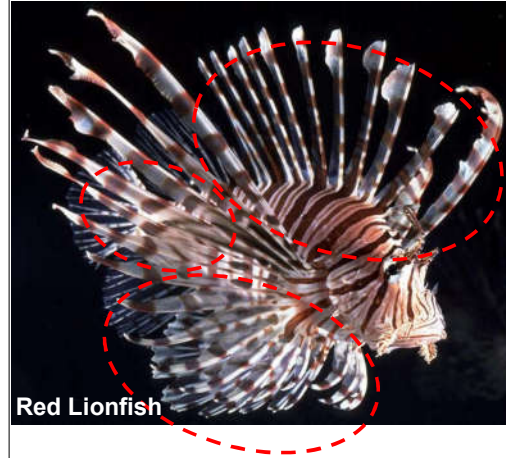
- Type of catfish
- Size : about 20cm
- Swim in groups when young (Stripe-Eel Catfish Sphere)
- Period : all year round
- Harm : all year round (especially during summer)
- Activity : **fishing**
- Symptoms : Pain, erythema, edema, necrosis



## Stripe-Eel Catfish

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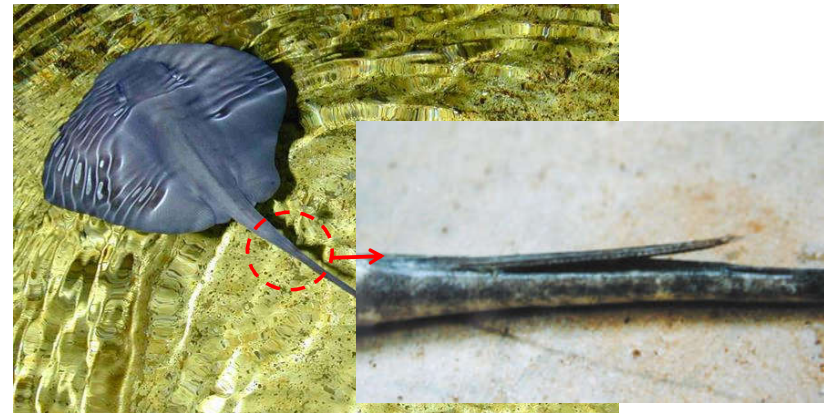
## Types of Lionfish



Red Lionfish

- Poison in dorsal, pelvic, and anal fins
- Swims slowly, tend to not swim away even when approached
- Harm : all year round (especially during summer)
- Activity : swimming, diving
- Injury sites : **hands and fingers**

## Types of Batoid (Ray)



- Many are benthic and have a tail with **poisonous spine**
- Harm
  - ① **physical puncture wound** by tail
  - ② symptoms due to **poison**
- **Fatalities** overseas and in Japan

## Stabbing Case Caused by Ray

Date/Time of occurrence : November 2006, around 6:30AM

Victim : Okinawa resident, 70's, male

Location : 1km from shore,  
water depth of 2m on sandy area

Activity during occurrence : fishing  
(injured when trying to release Ray  
caught in fishing net)

Injured site : **Right chest**  
(internal thoracic artery, right lung injury)

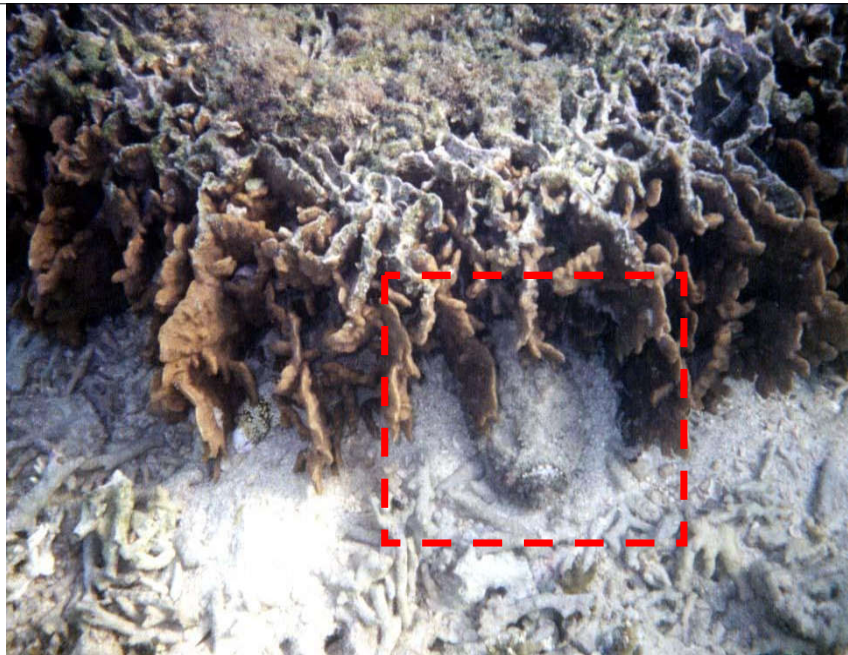
Organism : Round Ribbontail Ray

Situation:

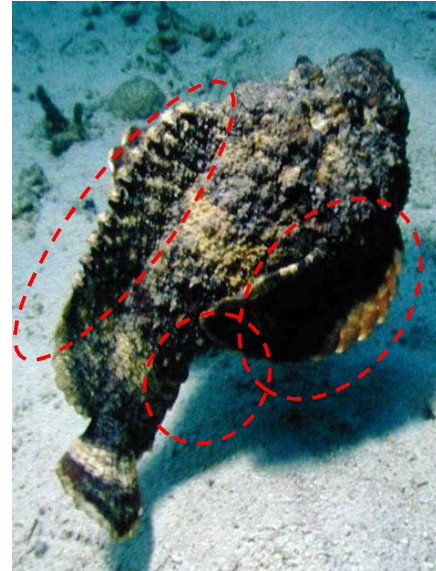
While on the boat, poisonous spine was removed and stopped bleeding by pressing with right hand. 4-5min later, rescued by fellow fisherman that just happened to pass-by, transported to hospital (could not move on his own, both hands were paralyzed). Arrived to hospital around 7:30AM (conscious, low blood pressure, in shock, heavy bleeding). Had emergency operation and survived.



Provided by Shimajiri Fire Department



## Stonefish



### Spine on Dorsal Fin

Habitat : coral reefs, shallow reef areas, sandy areas, etc.

Characteristics : about 40cm

**13 poisonous spines on dorsal fin, 2 poisonous spines each on anal and pelvic fins**

Symptoms : **Local** (pain, redness, blistering, paralysis)

**Whole body** (muscle weakness, convulsions, breathing • cardiac arrest)

## Stabbing Case Caused by Stonefish (likely)

Date/Time of occurrence :  
September 2012, 7:30 AM

Victim : Okinawa resident, 60's, male

Location : few meters from shore,  
**water depth of 1.5m** over sandy area

Injured site : **Left sole**  
(eight linear marks on the sole)

Organism : **Reef Stonefish (likely)**

Situation : Stabbed while reef walking,  
transported by ambulance

Symptoms : Pain, swelling, **compartment syndrome**, partial necrosis

Progression : Hospitalized for about 3 weeks. After discharge,  
additional one month needed for recovery

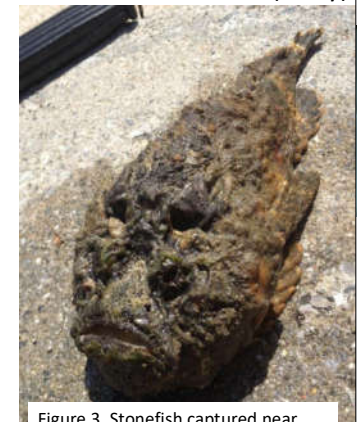


Figure 3. Stonefish captured near location of incident

## Fatality Caused by Stonefish (likely)

Date/Time of occurrence: August 2010, **around 8:50AM**

Victim: Okinawa resident, 50's, male (diving instructor)

- **Shallow water depth of 50cm** (sandy area), stabbed left sole.  
**Within few minutes of injury**, called fire dept.  
Beach staff provided First Aid (hot water method, squeezed poison out)  
Unconscious, **stopped breathing** ⇒ CPR until firefighters arrived
- 9:03 Firefighters arrived  
Cardiopulmonary arrest confirmed. Emergency transport while resuscitating.
- 9:15  
Doctor dispatched in *doctor-car*.  
Administered epinephrine.
- 9:28 Arrived at medical institution.  
Cardiopulmonary arrest
- **10:35 Death confirmed**



- ① Check whether there are any at the bottom using a stick, etc.
- ② Felt-soled marine boots



## First Aid (Echinoderm, Fish)

• Remove visible large spines

• Soak in **40~45°C hot water for 60~90 minutes** (to relieve pain)



## Types of Needlefish



- **very sharp jaw**
- **8 fatal cases** in Okinawa

• **Positively phototaxis**, rushes towards light and stabs  
⇒ when using light at night, place the light on arm, facing downwards



Stab case by type of needlefish  
Case: 30's, male  
Date/Time: July, 1968, 1:00AM  
Situation: stabbed in right face while fishing  
Progress: blind in right eye but survived

From Umi no Kiken Seibutsu Chiryō Manuaru

### Great White Shark



Research Institute for Subtropics (提供:横井謙尚)  
From Umi no Kiken Seibutsu Chiryou Manuaru

### Tiger Shark



Research Institute for Subtropics (提供:横井謙尚)  
From Umi no Kiken Seibutsu Chiryou Manuaru

## Types of Sharks

- About 120 species in the Japanese coastal waters, about 30 are dangerous species  
⇒ about 60% inhabited in Okinawa waters
- Size: small species are several tens of centimeters, large species are about 12m
- Dangerous period: all year round (incident increase during the summer)

Most species do not aggressively attack

## Past Shark Attacks in Okinawa

| No. | Date         | Gender | Age | Time    | Location                          | Activity | Distance (m) | Injury Site                  | Result  | Specific Organism            |
|-----|--------------|--------|-----|---------|-----------------------------------|----------|--------------|------------------------------|---------|------------------------------|
| 1   | 1935, Mar    | Male   | 14  | 11:00   | Ishigaki Island, Ibaruma          | Fishing  | 2000         | Abdomen, right thigh         | Serious | Unknown                      |
| 2   | 1940, Summer | Male   | 14  | 15:00   | Ishigaki Island, Ibaruma          | Fishing  | 2000         | Chest, back                  | Serious | Unknown                      |
| 3   | 1954, Jun    | Male   | 25  | 11:00   | Miyako Island, Hirara open-sea    | Fishing  | 1000         | Left knee, right foot        | Serious | Unknown                      |
| 4   | 1975, Aug    | Male   | 54  | Unknown | Okinawa Island, Nakaqasuku Harbor | Unknown  | Unknown      | Right upper limb, abdomen    | Dead    | Unknown                      |
| 5   | 1989, Jan    | Male   | 53  | 9:00    | Irabu Island, Sarahama            | Fishing  | 2000         | Left thigh                   | Serious | Unknown                      |
| 6   | 1996, Jul    | Male   | 52  | 9:40    | Miyako Island, Hirara open-sea    | Swimming | 1500         | Abdomen, right thigh         | Dead    | Great White Shark            |
| 7   | 1996, Aug    | Female | 19  | 12:00   | Hatoma Island, southern part      | Unknown  | 2500         | Head, right thigh            | Dead*   | Unknown                      |
| 8   | 1997, Jul    | Male   | 55  | Unknown | Miyako Island, Hirara open-sea    | Fishing  | 1600         | Thigh, buttocks              | Dead    | Unknown                      |
| 9   | 1997, Jul    | Male   | 41  | Unknown | Ikei Island, Agarihama            | Swimming | Unknown      | Thigh                        | Dead    | Unknown                      |
| 10  | 1998, May    | Male   | 63  | 6:00    | Miyako Island, Karimata open-sea  | Fishing  | 800          | Right wrist                  | Minor   | Unknown                      |
| 11  | 1999, Oct    | Male   | 19  | Unknown | Iriomote Island, Ubu Beach        | Swimming | 4500         | Left foot, left thigh        | Dead*   | Unknown                      |
| 12  | 2000, Sep    | Male   | 20  | 17:00   | Miyako Island, Sunayama Coast     | Surfing  | 70           | Left thigh, right lower limb | Dead    | Tiger Shark                  |
| 13  | 2005, Oct 22 | Male   | 27  | 22:00   | Miyako Island, Gusukube open-sea  | Fishing  | 500          | Left Shoulder                | Minor   | Whitetip reef shark (likely) |

Distance: from harbor to incident site or where body was found \*Potentially attacked after drowning  
Source: 32<sup>nd</sup> Okinawa Prefectural Institute of Public Health Abstract by Akira Shinjo, but No.13 was added

## Recent Shark Incident

October 27, 2015  
平成27年10月27日

分類名 海洋生物 面

新報 琉球新報

朝刊 朝刊

その他 ( )

男性がサメに襲われた現場

糸満市 大度海岸

約500~600m

26日午前8時50分ごろ、糸満市大度海岸で、マリンスポーツ中の男性から「サメに足をかまれた」という通報があった。サメによる襲撃は、糸満市では初めて。襲撃を受けたのは、糸満市在住の男性。襲撃を受けたのは、糸満市在住の男性。襲撃を受けたのは、糸満市在住の男性。

サメ襲撃 男性けが

糸満沖 体長3mが自力で逃げる

糸満市大度海岸で、26日午前8時50分ごろ、マリンスポーツ中の男性から「サメに足をかまれた」という通報があった。サメによる襲撃は、糸満市では初めて。襲撃を受けたのは、糸満市在住の男性。襲撃を受けたのは、糸満市在住の男性。襲撃を受けたのは、糸満市在住の男性。

Ryukyu Shimpo 151027

Shark Attack  
Man Injured  
Itoiman Harbor  
3m Length  
Managed to  
Escape on Own

## Recent Shark Incident



Shark Attack  
Itoiman Harbor  
3m Length  
Managed to  
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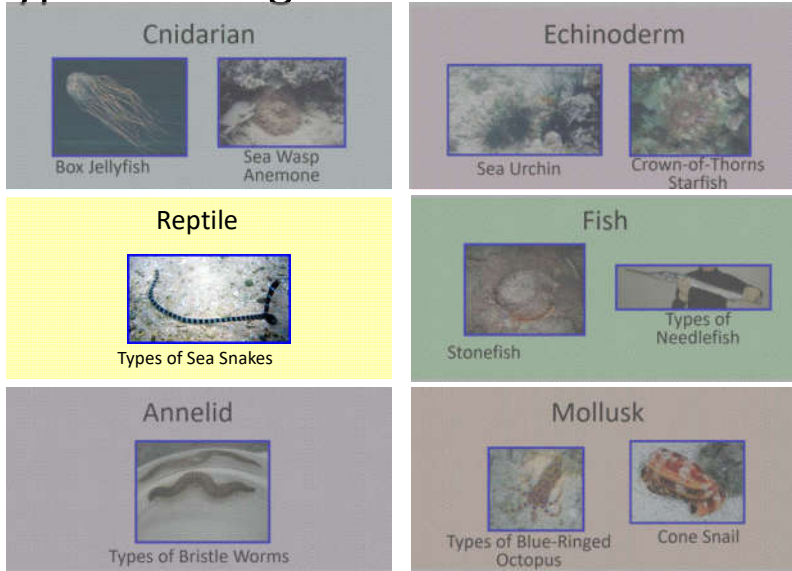
Shimpo 151027

## To Avoid Shark Injuries

- ① **Do not approach sharks**  
 (Do not swim in the early morning or evening at dangerous locations )
  - Do not enter beaches where sharks appear
  - Do not enter beaches in the early morning or evening when they are more active
- ② **Do not let the shark get close (do not gather sharks)**
  - Do not bleed or urinate in water
  - Do not leave trash or leftover food at the beach

From SHARKS Same – Umi no Oujatachi

## Types of Dangerous Marine Creatures



## Sea Snake (Reptile)

Blue-Banded Sea Snake  
*Hydrophis cyanocinctus*



- Type of cobra with strong neurotoxins and muscle poisons
- 8 species inhabit in Okinawa

Harm: mischief, while fishing  
 Case: 8 fatal cases in Okinawa



Blue-Lipped Sea Krait  
*Laticauda laticaudata*



Slender-Necked Sea Snake  
*Hydrophis melanocephalus*

## *Hydrophis melanocephalus*



## *Hydrophis melanocephalus*



## Bite Case Caused by Sea Snake

Victim: Okinawa resident, 50's, male

Date/Time of occurrence: January 1989, 6:30PM

Situation: bitten on **right 2<sup>nd</sup> finger**

while prepping the sea snake at home.

Quickly removed it, sucked the blood out

few times with mouth. Next morning,

**muscle pain throughout whole body, lower limbs stiff, head feeling heavy, black urine**

Organism: blue-banded sea snake (*H. cyanocinctus*) (identified at the Institute)

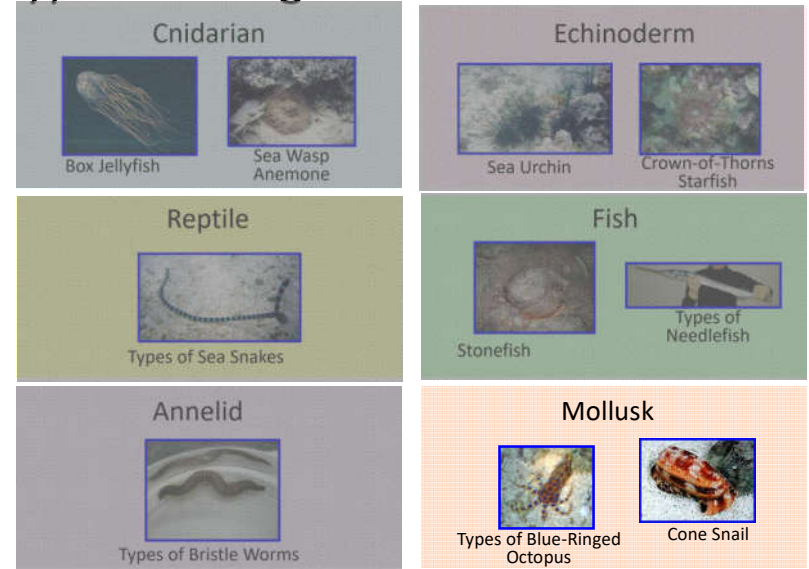
Symptoms during inspection: **muscle pain throughout body, ptosis, mouth spasm, difficulty in swallowing, swelling, tenderness, excessive sweating, reddening of face, nausea**, etc.

Progress: after hospitalization, fluid was replaced, rapid improvement.

Pain and other symptoms relieved in 3-4 days, autonomic nervous symptoms relieved in 4-5 days. Eye movement disorder relieved in about 1 month.



## Types of Dangerous Marine Creatures



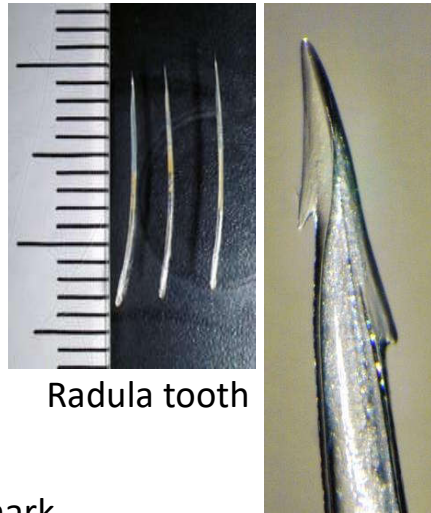
## Geography Cone (*Conus geographus*)



- Size: about 10cm
- Have **strong neurotoxin**
- Symptoms: **numbness** ⇒ risk of drowning
- There have been cases while gathering clams/shells
- **6 fatal** cases reported in Okinawa



## Geography Cone

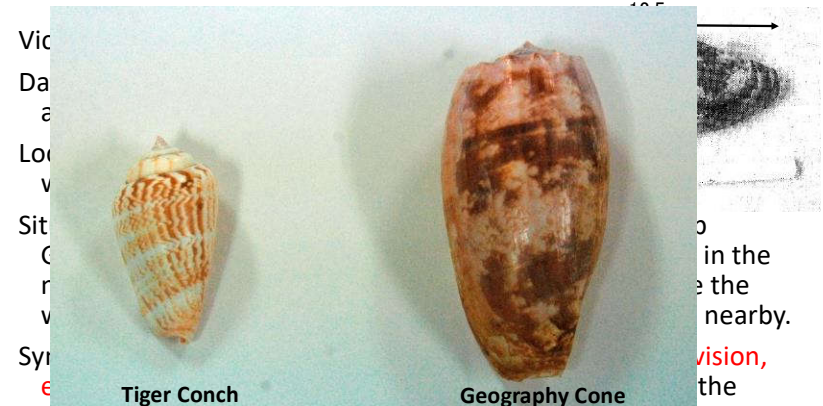


Radula tooth



Sting mark

## Sting Case Caused by Geography Cone



Tiger Conch

Geography Cone

hospital, **perception disorder, breathing disorder.**

Progression: discharged after 6 days of hospitalization (no subsequent complications)

## Sting Case Caused by Geography Cone

Victim: Okinawa resident, 30's, male

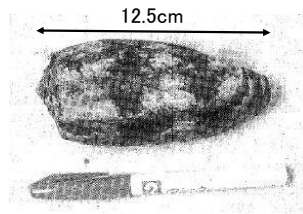
Date/Time of occurrence: May 1996, around 11:00AM

Location: Okinawa, 950m from coast, water depth of 1.5m

Situation: snorkeling to collect clams, mistakenly picked up Geography Cone, thinking it was Tiger Conch. When left in the net bag, **stung inner left wrist**. **Radula** was still left inside the wounded area; sucked after its removal. Helped by man nearby.

Symptoms: within 30 minutes of injury, **dizziness, double vision, excessive thirst, fatigue, and gait**. By the time arrived at the hospital, **perception disorder, breathing disorder**.

Progression: discharged after 6 days of hospitalization (no subsequent complications)



## Types of Cone Snails



- **Many species** of cone snails inhabit in Okinawa
- **Toxicity varies by species**
- Requires caution because **some species look as though there is nothing inside** ("minashigai," no-insides-shell)













# First Aid (Sea Snakes, Cone Snails)

**Go to hospital** (do not drive on your own)

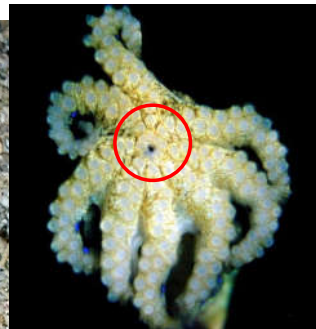


**\* Go to hospital because it can lead to death**

# Types of Dangerous Marine Creatures

|  |   |
|--|---|
| <p><b>Cnidarian</b></p>  <p>Box Jellyfish</p>  <p>Sea Wasp Anemone</p> | <p><b>Echinoderm</b></p>  <p>Sea Urchin</p>  <p>Crown-of-Thorns Starfish</p>  |
| <p><b>Reptile</b></p>  <p>Types of Sea Snakes</p>   | <p><b>Fish</b></p>  <p>Stonefish</p>  <p>Types of Needlefish</p>              |
| <p><b>Annelid</b></p>  <p>Types of Bristle Worms</p>  | <p><b>Mollusk</b></p>  <p>Types of Blue-Ringed Octopus</p>  <p>Cone Snail</p> |

# Type of Blue-Ringed Octopus



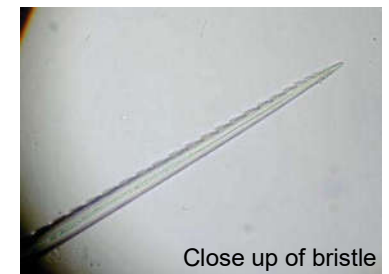
**Poison: tetrodotoxin (neurotoxin)**  
No case reported in Okinawa  
Fatal cases abroad

**First Aid**  
**Do not suck with mouth**  
(dangerous if swallowed)  
**Go to hospital**  
(do not drive on your own)

# Types of Bristle Worms



- Produces **poisonous bristles** when stimulated
- Habitat: seabed, under rocks
- Symptoms: pain, itch, papule, blister



Close up of bristle

**First Aid**  
**Remove bristle with tape, etc.**

# To Prevent Damage

## Preventative Measures in Okinawa

Many referred to measures taken in [Australia](#)

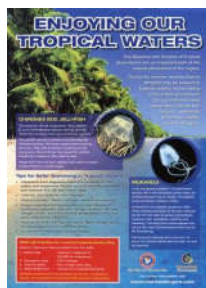
- **First Aid** for Box Jellyfish sting **using vinegar**  
⇒ applying the same first aid method for Australia's *Chironex fleckeri* to Box Jellyfish
- **Box Jellyfish intrusion prevention net**



Jellyfish intrusion prevention net



Vinegar for First Aid



Warning Poster

## Box Jellyfish Intrusion Prevention Net

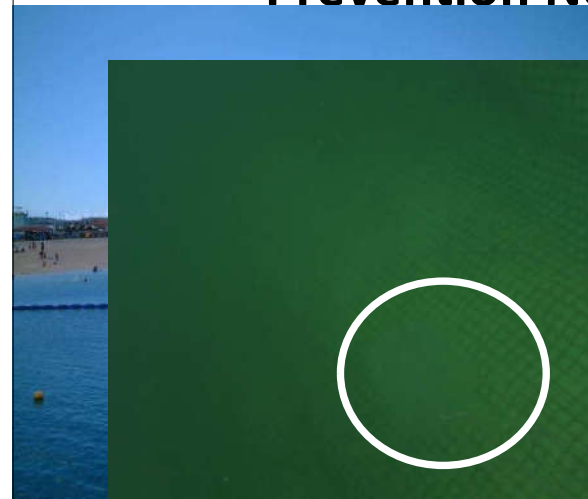


Beach Locations with Nets  
As of March 2013



- Beaches that require report based on Prevention of Okinawa Disaster and Securing Safety of Swimmers, etc.
- Time when the nets are placed depends on the beaches, so it is recommended to check at the beach directly.

## Box Jellyfish Intrusion Prevention Net



Beach Locations with Nets  
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# Box Jellyfish Intrusion Prevention Net

Beach Locations with Nets  
As of March 2013



**Very important to manage the nets!!**

- Beaches that require report based on Prevention of Okinawa Disaster and Securing Safety of Swimmers, etc.
- Time when the nets are placed depends on the beaches, so it is recommended to check at the beach directly.

## Prevention Measure

(when there are no Box Jellyfish Intrusion Prevention Nets)

- **Check** that there are no dangerous marine creatures
- Bring **vinegar** just in case (for Box Jellyfish)
- **Reduce skin exposure** (mostly for cnidarians)  
Long-sleeve shirts, leggings, stinger suits, etc.

Stinging filament (needle) length ... about 250 $\mu$ m (1/4mm)



✘ cannot completely prevent harm

## Damage Reduction Equipment

Marine gloves, etc.



Stinger Suits, etc.

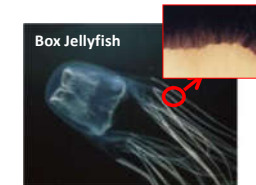


Felt Sole Boots



Sea Wasp Anemone

Prevent touching sea anemone, etc., unknowingly



Box Jellyfish

Prevent tentacles of jellyfish, etc., from touching skin



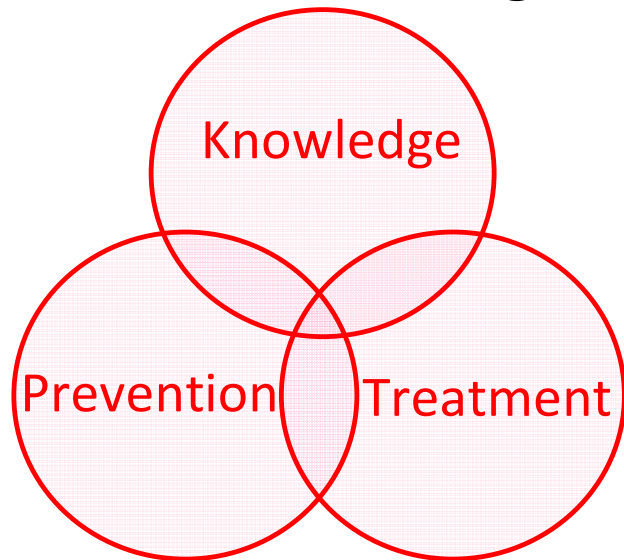
Stonefish

Prevent stepping on poisonous spines of Stonefish, etc.

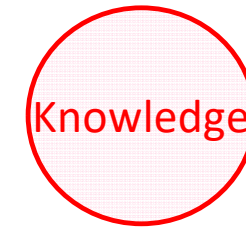




## To Prevent Damage...



## To Prevent Damage in Advance



- Types and ecologies of dangerous creatures
- Not touching unknown creatures

## To Prevent Damage in Advance

Box Jellyfish Intrusion  
Prevention Net



Marine gloves, etc.



- Swim inside the nets
- Properly maintain the nets
- Check for warnings (signs)
- Harm reduction equipment (wearing long-sleeves, pants, marine boots, etc.)

# To Prevent Damage in Advance

Using vinegar (Box Jellyfish)



Hot Water Treatment (Fish, Echinoderm)



- Know proper first aid
- Know how to provide CPR
- Prepare vinegar (Box Jellyfish)

## Let's Be Careful! Dangerous Marine Life Leaflet



Can download from Okinawa Prefectural Institute of Health and Environment website

## Available in Multiple Languages!!



Languages in Traditional Chinese, Simplified Chinese, and Korean

Available on website!!

## DVD/Video Available for Purchase



Cinema Okinawa  
TEL: 098-857-5533  
Price: 1,500yen

Available on YouTube



Search on Okinawa Prefectural website or on Okinawa Prefectural Institute of Health and Environment website

Available in multiple languages!!

