

MARINE FOOD POISONING

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DISCLOSURES:

None relevant to this presentation.



MARINE FOOD POISONINGS COVERED TODAY:

- Tetrodotoxin
- Scombroid
- Ciguatera
- Chelonitoxism (sea turtles)

TETRODOTOXIN

- Pufferfish
- Porcupinefish
- Sunfish (*Mola spp*)
- Mollusks
 - Ivory shell
 - Lined moon shell
 - Calf moon shell
 - Bladder moon shell
 - Trumpet shell
- Australian blue-ringed octopus
- Starfish
- Xanthid crab, Mangrove horseshoe crab
- Ribbon worm, Flat worm



TETRODOTOXIN

- Pufferfish
 - Marine bacteria produce TTX
 - Highest concentration in spawning season
 - Heat-stable, withstands freezing
- Most human exposures: *Fugu*
 - Specially prepared dish of raw pufferfish fillet
 - TTX concentrations:
 - Ovaries > liver >> intestines/skin >> muscle



PATHOPHYSIOLOGY

- Blocks nerve action potentials
 - Voltage-gated, fast sodium channels
 - Stops axonal transmission
 - Without affecting the neuromuscular junction
- Peripheral vasodilation
 - Independent of α - or β - adrenergic receptors
- Dose-dependent

CLINICAL PRESENTATION

- Onset: within 30 minutes (up to 4 hr)
- Initial s/s:
 - Paresthesias of lips and tongue
- Followed by:
 - General: Diaphoresis, weakness, cyanosis
 - GI: N/V, abdominal pain
 - HEENT: hypersalivation, dysphagia, aphonia, blurred vision
 - Initial miosis → mydriasis with poor pupillary reflex
 - Resp: dyspnea, bronchorrhea, bronchospasm
 - Neuro: ataxia, body paresthesias

CLINICAL PRESENTATION

- Life-threatening
 - Disseminated intravascular coagulation-like syndrome
 - Petechial skin hemorrhages → bullous desquamation
- Hypotension
 - Profound, refractory
- Bradycardia, AV node conduction abnormalities
- Respiratory paralysis, CV collapse → death

MANAGEMENT

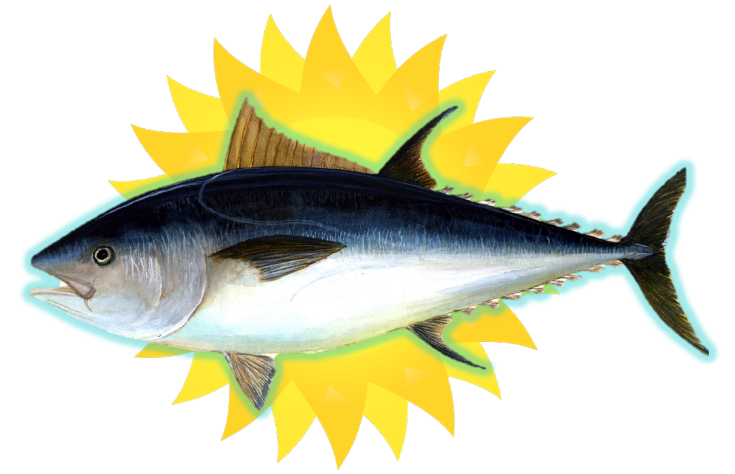
- GI Decon:
 - Activated charcoal if no contraindications
- Bradycardia:
 - Atropine
- Hypotension:
 - IV fluids, norepinephrine, phenylephrine
- Respiratory support, ventilation

MANAGEMENT

- Minor intoxication:
 - Paresthesias, mild dysphagia
 - Monitor in ED or ICU for at least 8 hours
 - Can consider discharge after 8 hours **IF** symptoms are improving

SCOMBROID

- Most common US seafood poisoning reported



- Scombridae family

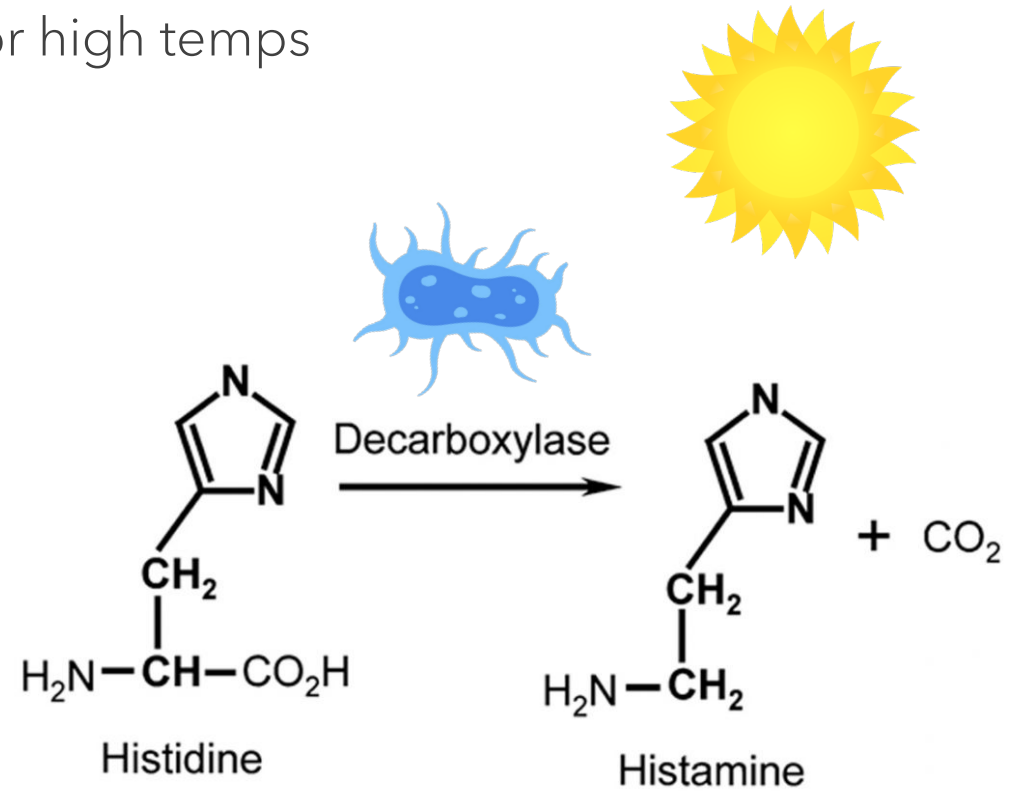
- Tunas
 - Albacore
 - Bluefin
 - Yellowfin
- Mackerel
- Saury
- Needlefish
- Wahoo
- Skipjack

- Non-Scombridae

- Mahi-mahi (dolphinfish)
- Kahawai
- Sardines
- Black marlin
- Pilchard
- Anchovy
- Herring
- Amberjack (yellowtail or kahala)
- Australian ocean salmon

PATHOPHYSIOLOGY

- Inadequate preservation or refrigeration
 - Several hours of ambient or high temps
 - Bacterial decomposition
- High amounts of histamine
 - Heat stable
 - Metallic or peppery taste
 - Appears normal



CLINICAL PRESENTATION

- Symptoms onset: minutes
- Pseudo-allergic reaction
 - Headache
 - Diffuse erythema, pruritus, sensation of warmth
 - Flushing of the head, neck, and torso
 - N/V/D, Abdominal pain
 - Conjunctival injection
 - Burning of the mouth/oropharynx
 - Dizziness

CLINICAL PRESENTATION

- *Rare:*
 - Bronchospasm
 - Hypotension
 - Dysrhythmias
 - Generalized urticaria
- Caution
 - In underlying respiratory or CV disease
 - Taking Isoniazid



MANAGEMENT

- Self-limited illness
 - Average duration: 6-12 hours
- Can try a combo of H1 & H2
 - H1 receptor antagonists
 - Diphenhydramine, Hydroxyzine
 - H2 receptor antagonists
 - Famotidine, Ranitidine
- Other supportive care:
 - Ondansetron, analgesics, IV fluids, bronchodilators



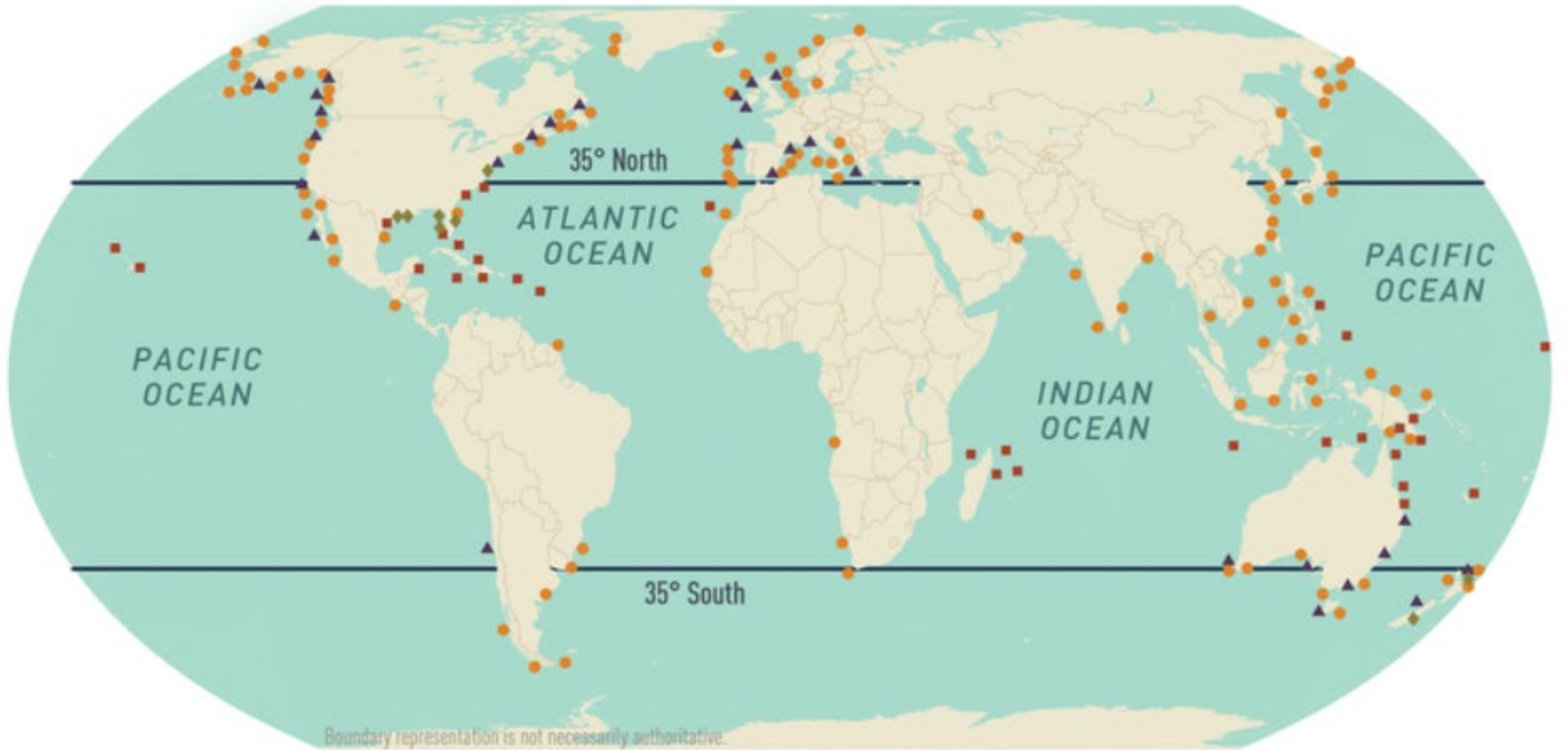
PREVENTION

- Only effective measure:
 - Consistent temperature control <4.4 C
- Warning signs
 - Improper handling
 - Ammonia smell
 - "Dull" packaged fish
 - Fresh fish appear sheen/oily rainbow
- Notify local public health authorities if sick



CIGUATERA

- Subtropical and tropical Indo-Pacific and Caribbean
- Toxin found in warm water, bottom-dwelling reef fish
 - Fish species examples: barracuda, sea bass, parrot fish, red snapper, grouper, amber jack, kingfish and sturgeon
- Incidence: about 50,000 - 500,000 cases per year
 - Most occur in Pacific islands but increasing number in mainland US



US National Office for Harmful Algal Blooms

Woods Hole Oceanographic Institution

<https://hab.whoi.edu/maps/regions-world-distribution/>

- ▲ Amnesic Shellfish Poisoning
- Ciguatera Fish Poisoning
- ◆ Neurotoxic Shellfish Poisoning
- Paralytic Shellfish Poisoning

CIGUATOXIN



- Produced by microalgae genera Gambierdiscus and Fukuyoa
- Multiple ciguatoxins: CTX-1A to CTX-4B
 - Starts as CTX-4B in microalgae
 - Big fish eats the smaller fish...
 - Each transfer results in biotransformation
 - CTX-4B ultimately converted to CTX-1B (most toxic)
 - Heat stable
 - lipid soluble
 - acid stable
 - odorless
 - tasteless



PATHOPHYSIOLOGY

- Binds voltage-sensitive Na channels = increased Na permeability
 - Na influx causes both depolarization and cellular swelling
- Clinical features suggest affinity for sensory afferent nerve fibers
- Variety of ciguatoxins = variable symptoms and severities



CLINICAL EFFECTS

- **General:**
 - Profuse diaphoresis, headaches, myalgias and arthralgias
- **Gastrointestinal:**
 - Abdominal pain/cramps, nausea, vomiting, profuse watery diarrhea
 - Lasts 24-48 hours
- **Cardiovascular:**
 - Bradycardia and orthostatic hypotension
- **Respiratory:**
 - Respiratory paralysis only in severe cases



CLINICAL EFFECTS

- Genitourinary:
 - Dyspareunia and vaginal/pelvic discomfort
- Neurological:
 - Seizures
 - Peripheral dysesthesias/paresthesias, reversal of temperature discrimination***
 - Numbness of tongue, lips, throat and perioral area
 - Pruritis
 - Feeling of loose/painful teeth, **metallic taste**
 - Ataxia, weakness, vertigo
 - Visual disturbance
- Can last days to weeks and have relapsing symptoms



DIAGNOSTIC STUDIES

- Diagnosis is clinical
 - GI symptoms followed by paresthesias, cold dysesthesia and pruritus after eating seafood
- Rule out other causes
- Can send out Ciguatera specific testing:
 - ELISA test for Ciguatera toxin
 - High-pressure Liquid Chromatography
 - In development: dipstick immunobead assay test for field use to test fish



TREATMENT

- Supportive care
 - GI symptoms common- IV fluids & electrolyte replacement
- Activated charcoal may be of some benefit
- Atropine for bradycardia, can also help with diarrhea
- Anti-histamines for pruritus
- IV Mannitol?
- Amitriptyline, gabapentin and pregabalin have variable beneficial effect on long-lasting neurological dysfunction



CHELONITOXISM

- Pacific marine turtles
 - Green sea turtle (*C. mydas*)
 - Hawksbill (*E. imbricata*)
 - Loggerhead (*C. caretta gigas*)
 - Leatherback (*D. coriacea*)
 - Soft shell turtle (*P. bibroni*)



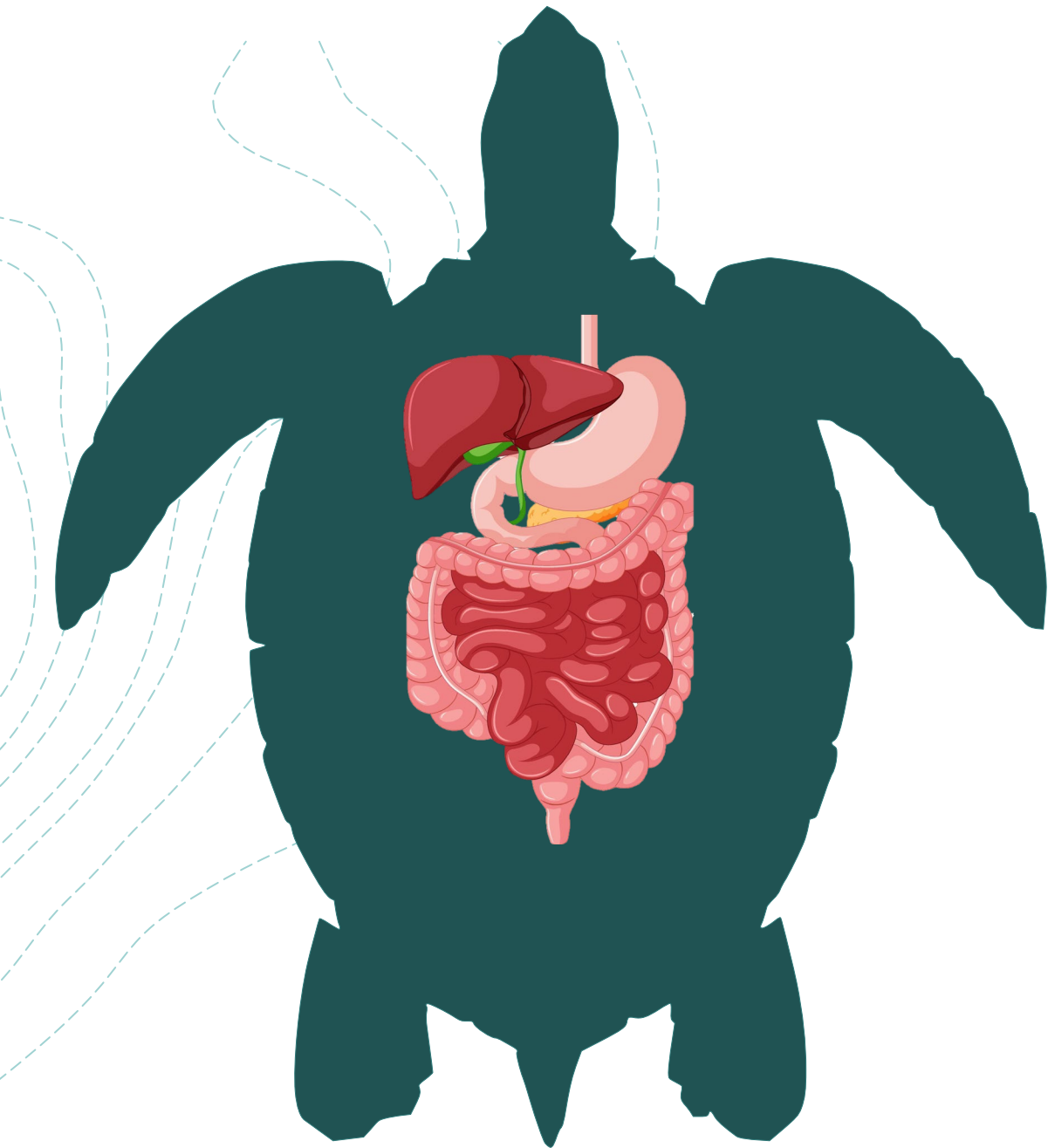
CHELONITOXISM

- Toxic algae diet
 - Accumulation in turtle tissues
 - Turtle appears healthy
- *Lyngbyatoxins* in *C mydas*
- Also contain
 - Heavy metals
 - Organo-compounds



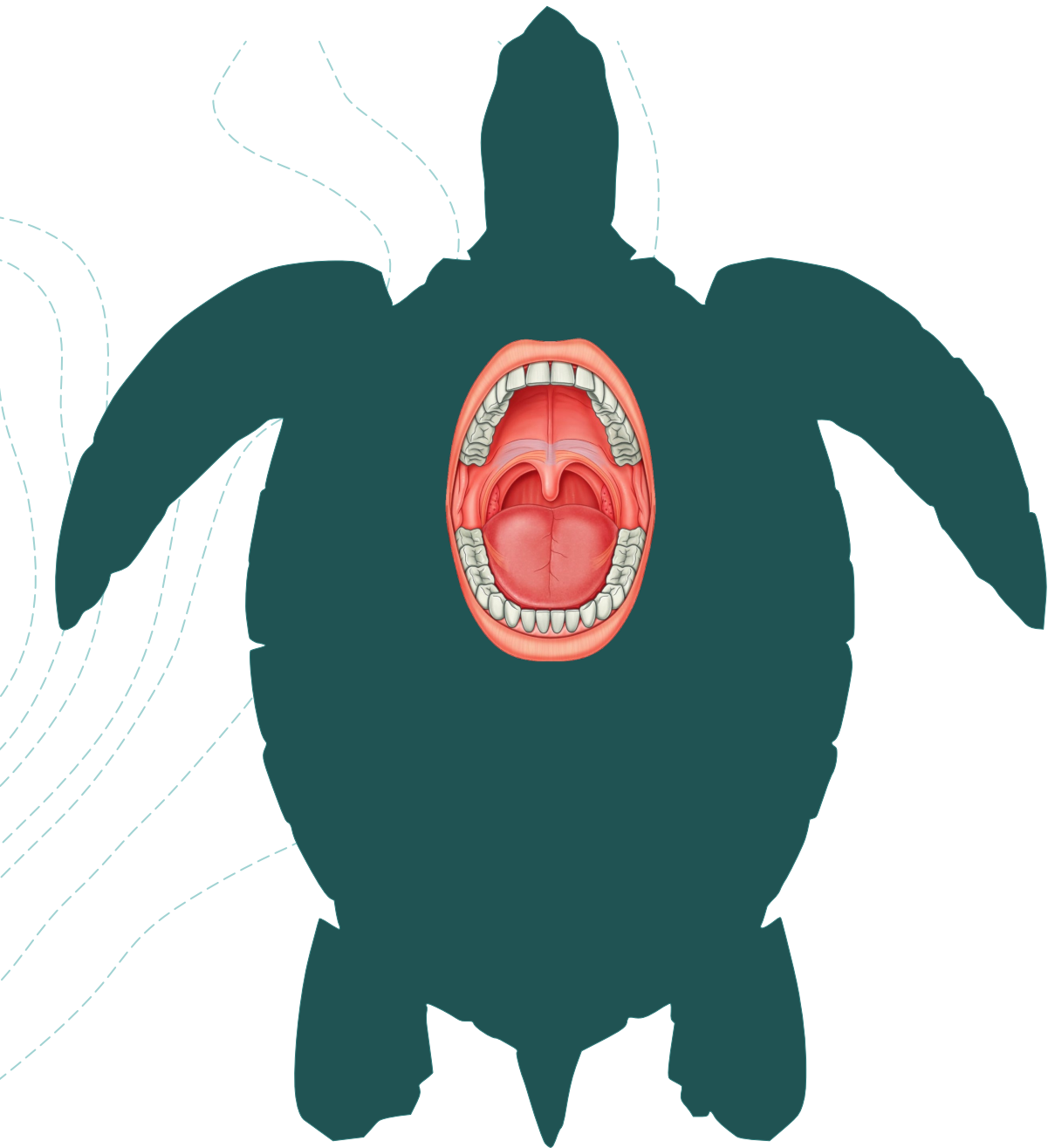
CHELONITOXISM

- ENTIRE turtle is toxic
- HEAT STABLE
- Freshness of meat is irrelevant
- Transmission
 - Ingestion
 - Breast milk



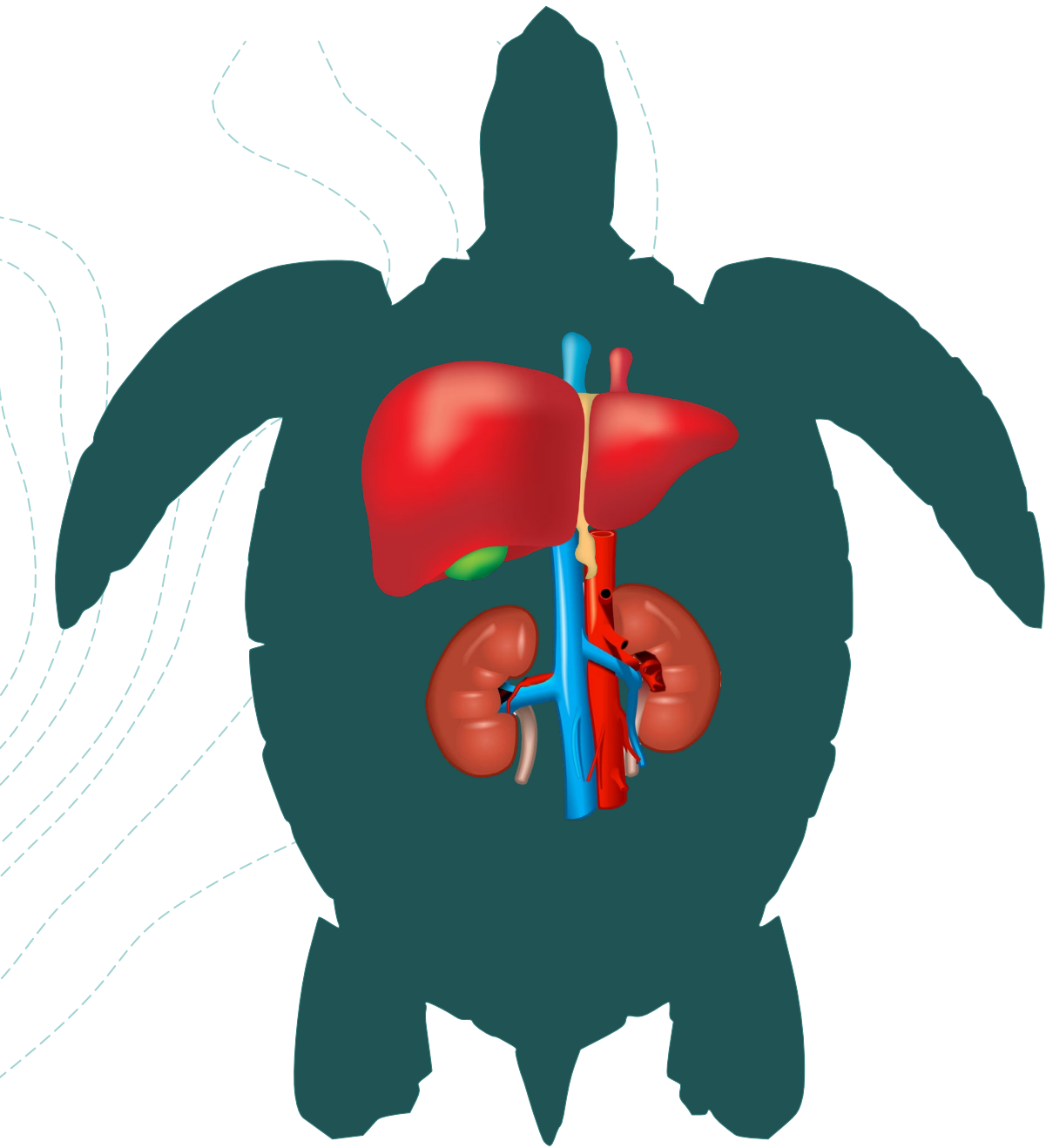
CLINICAL PRESENTATION

- *Begins 1-48 hours post-ingestion*
- GI
 - Abdominal pain
 - Nausea
 - Vomiting
 - Diarrhea



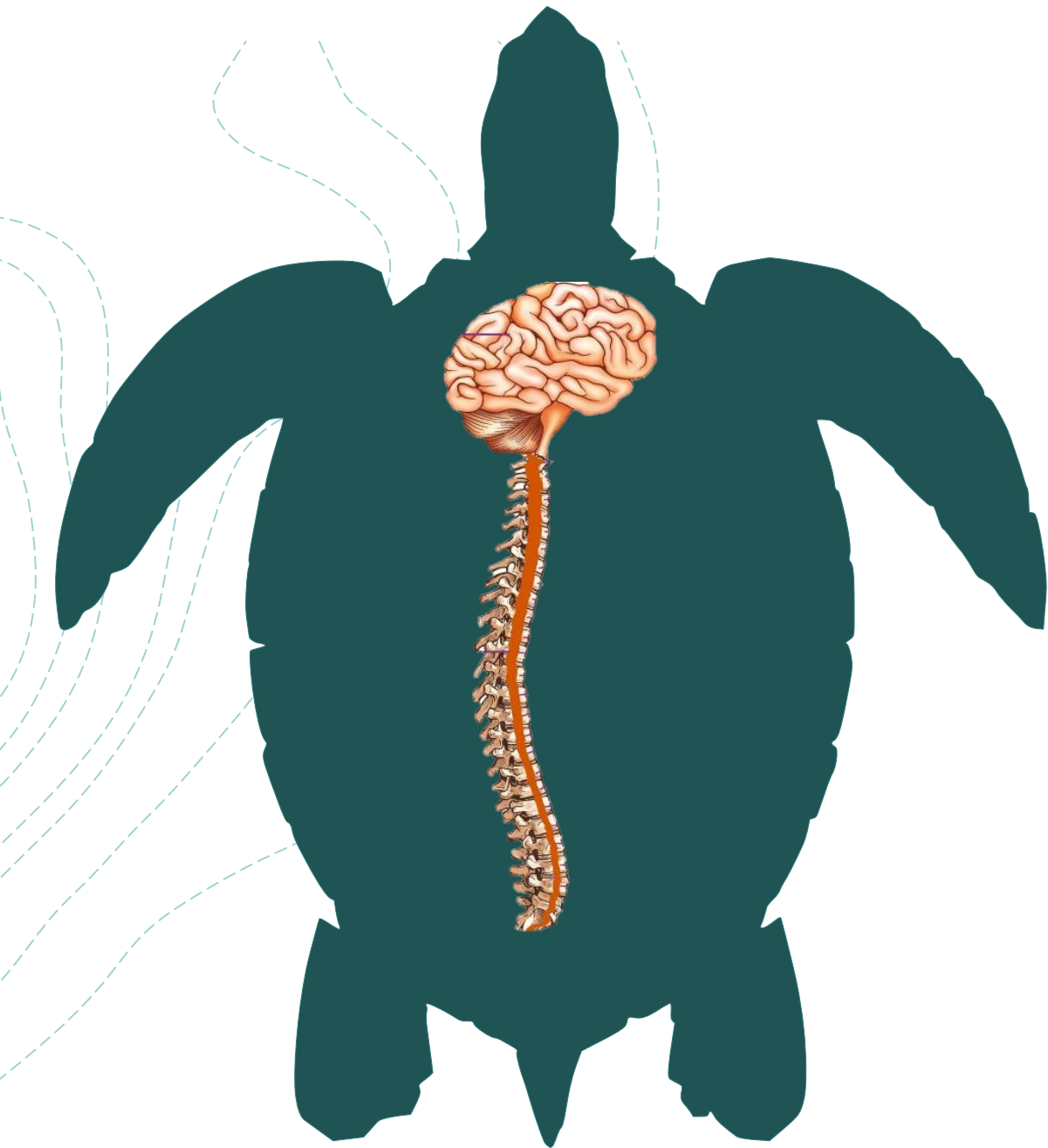
CLINICAL PRESENTATION

- HEENT
 - Pain/Itching in oral cavity
 - Ulcerative glossitis
 - Ulcerative stomatitis
 - Pharyngitis
 - Hypersalivation
 - Scleral Icterus



CLINICAL PRESENTATION

- HEPATORENAL
 - Hepatosplenomegaly
 - Centrilobular hepatic necrosis with fatty degeneration
 - Renal failure

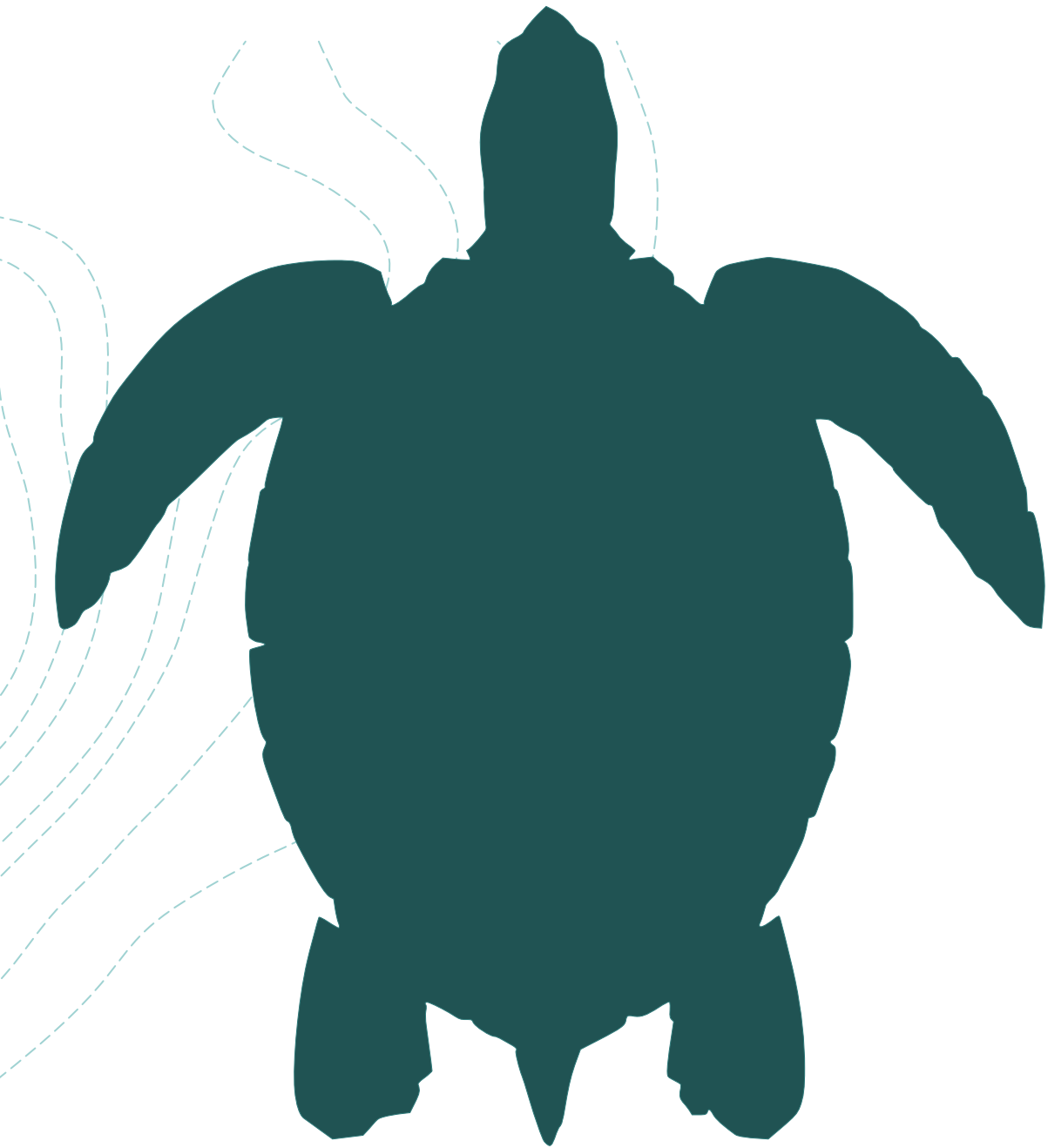


CLINICAL PRESENTATION

- NEUROLOGIC

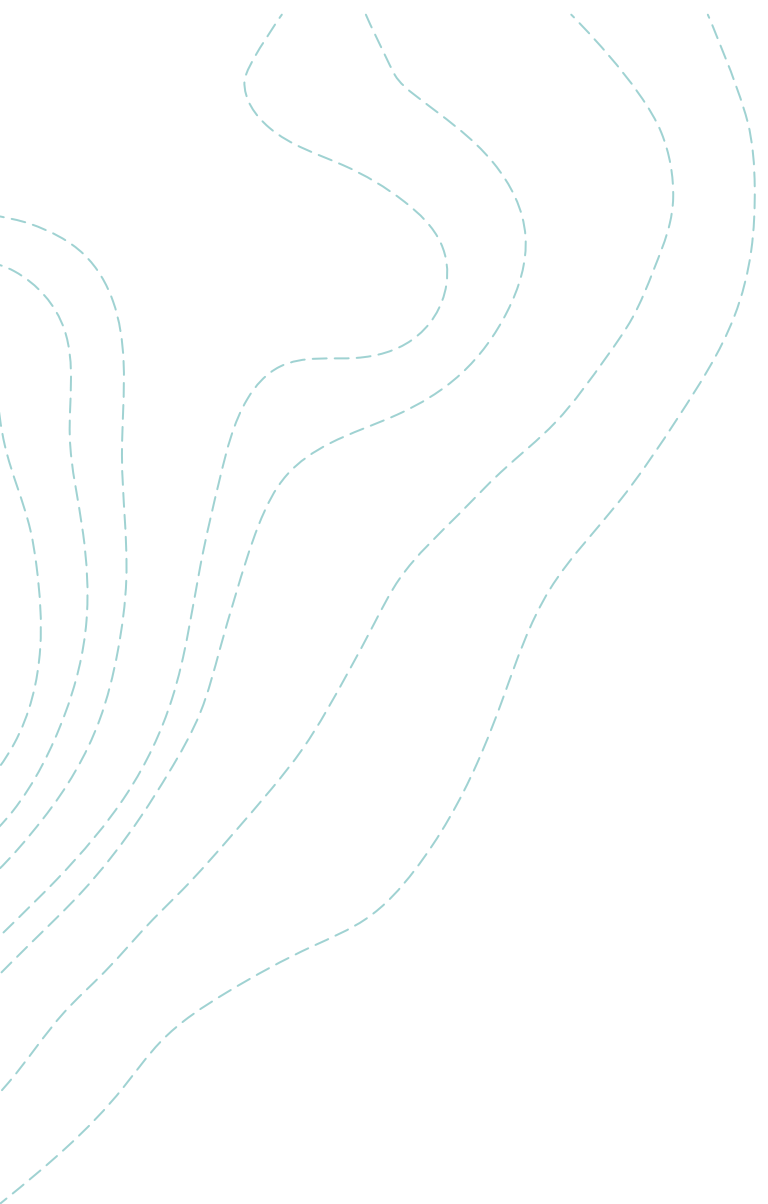
- Vertigo
- Confusion
- Seizures
- Paralysis

→ Seizure / Coma / Death



CLINICAL PRESENTATION

- MISC
 - Desquamative dermatitis
 - Diaphoresis
 - Somnolence
 - Hypotension



DIAGNOSIS

- Difficult
 - Appears like other food poisonings
- Clinical mostly
 - Newer testing can confirm sea turtle ingestion



MANAGEMENT

- SUPPORTIVE CARE
 - IVF
 - Electrolytes
 - Respiratory support & mechanical ventilation
- NO ANTIDOTE



MASS OUTBREAKS

- Turtles consumed in group celebrations
- Children most susceptible



MASS OUTBREAKS

- Madagascar 199
- Philippines
 - Cebu 1917
 - Mindanao 1954
 - Sorsogon
 - Eastern Samar 2013
- Federated States of Micronesia 2010
- Zanzibar 2024

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THANK YOU

QUESTIONS?

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