SICK AT SEA: THE CASE OF THE QUEASY CAPTAIN

Video page  Text/Script
• British explorer Captain James Cook faced violent storms, dense fog and looming icebergs in his years at sea.
• With his ship, Resolution, anchored off New Caledonia, in the South Pacific, the captain now faces a dire new challenge.
• In the wee small hours, a mysterious illness struck Cook and two naturalists sailing with him.
• The ship’s dogs were affected, too - and the next morning a pig, “having swelled to unusual size,” died. Can you find out what poisoned them?

Title and directions

SHIP
• Touch the screen for clues

Wine cup
• Cook’s personal cup

Could this be the poison?
Cook’s cup is made of the toxic metal antimony. Acid in wine might release some of the metal.

What to look for
Nausea, vomiting, limb weakness, pallor

Picture of cup
Cook took this cup around the world on three voyages.

Bread
• Served at supper

Could this be the poison?
During long sea voyages, bread can get moldy—and some molds are deadly. Ergot mold may infest grains; the flour milled from infested grains may be highly toxic.

What to look for
Nausea, vomiting, limb weakness, hallucinations

*Picture of infested grain*

Ergot toxins—including ergotamine—can survive the heat of baking.
Paint bucket
• Ship is repainted constantly

Could this be the poison?
Keeping Resolution ship-shape requires constant repainting; anything white was lead-based paint. Contact with lead dust or paint chips sickens people.

What to look for
Nausea, vomiting, pallor, irritability

Picture of paint bucket?
Lead was used in household paints until 1978 in the US.

Medical kit
• Belongs to ship’s doctor

Could this be the poison?
The medicine calomel, mercurous chloride, was used to treat everything from depression to constipation. But now we know that mercury is a highly toxic metal.

What to look for
Nausea, vomiting, pallor, difficulty balancing, irritability

Picture of calomel bottle? (we can get pix of our object on display)
Though toxic, mercury was used in medicines for centuries.
Animal skins
• Taxidermy done aboard ship

Could this be the poison?
An arsenic solution prevents insects and molds from damaging the naturalists’ specimens. Contact with arsenic is dangerous.

What to look for
Nausea, vomiting, limb weakness, difficulty balancing

Picture of taxidermy bird?
Skins were washed in an arsenic solution and stuffed with arsenic-soaked fiber.

Credit: MNHN Paris

Pufferfish
(Lagocephalus sceleratus)
• Served at supper

Could this be the poison?
Tetrodotoxin, a powerful nerve poison, is found in the liver and reproductive organs of some pufferfish.

What to look for
Nausea, limb weakness, tingling in hands and feet, difficulty balancing, sensory confusion, feelings of doom, pallor

Forster’s picture of fish
A local fisherman sold the pufferfish to Cook for a piece of bark cloth; the ship’s naturalist drew it.

Pig
On long voyages, small farm animals were kept below decks to provide fresh meat. The animals mostly ate scraps from the dinner table.
### COOK’S CABIN

Touch the screen for clues.

Credit: The Art Archive/Art Resource, NY [Background]

Credit: The Granger Collection, New York [Face]

[Touchable spots, pop-up text]

### Head

_The men feel a “great deal of languor and oppression.”_

FOUND: Feelings of doom  
No hallucinations  
No irritability

POTENTIAL CAUSES: Victims are terrified and listless—at the same time. Look for a poison with mental effects.

CLUES ADDED

### Face/lips

_Doctor notes that victims are pale and their lips have a bluish tinge._

FOUND: Pallor

POTENTIAL CAUSES: Pale skin is often associated with nausea.

CLUES ADDED

### Hands

_Cook experiences a “Sensation like to that caused by exposeing ones hands or feet to a fire after having been pinched much by frost.”_

FOUND: Tingling in hands and feet

POTENTIAL CAUSES: Cook couldn’t have frostbite—he’s in the South Pacific. Tingling is the sign of a nerve poison.

CLUES ADDED
Arms

*Cook* says he had "almost lost the sense of feeling nor could I distinguish between light and heavy bodies. A quart pot full of Water and a feather was the same in my hand."

FOUND: Sensory confusion

POTENTIAL CAUSES: If the Captain can no longer trust his senses, the poison must be affecting his nerves.

ADDED TO CLUES

Stomach

*The naturalist* recalls that for supper, the men ate some of a fish that he had been sketching all afternoon.

FOUND: Nausea, vomiting

POTENTIAL CAUSES: The weather was warm and there was no way to keep things cold. Had they eaten spoiled food?

ADDED TO CLUES

Legs

*The men find themselves* “unable to walk without holding onto the wall or a table”; they are "seized with an extraordinary weakness in our limbs."

FOUND: Limb weakness, trouble with balance

POTENTIAL CAUSES: Many poisons cause weakness, which could explain Cook’s trouble walking. But this one causes trouble balancing, too.

ADDED TO CLUES
Wrong answers

[Antimony cup]
“Cure,” not Cause
Doctors once thought antimony dissolved into wine made patients vomit up a real poison. Indeed, the ship’s doctor gave Cook antimonial wine once he started feeling ill. But this “cure” doesn’t work—and in any case there was too little antimony in the drink to cause all of Cook’s symptoms. Try again.

[Lead paint]
It’s Not the Lead
Lead paint—flakes and dust—can definitely be dangerous. But the captain was the absolute ruler of his ship. Sand the ship’s woodwork or use a paintbrush? Never! He certainly wouldn’t have been poisoned by lead paint.

[Ergot]
Edible Bread
Ergot, a grain fungus, causes hallucinations and even death. But everyone aboard ate bread, so the whole crew would have been sick. The bread was safe.

[Animal skins]
Keep Searching
Onboard naturalists washed skins in water containing dissolved arsenic. But the solution was weak, they only got it on their hands, not in their stomachs—and Cook wasn’t working with it. Find another culprit.

[Calomel!]
Pick Another Poison
In Cook’s day, patients swallowed the mercury salt called calomel for everything from rheumatism to constipation. Mercury taken this way causes impressive intestinal symptoms—but not sudden ones. Try again.

MORE INFO

Wine cup
•Cook’s personal cup
Cook’s personal wine cup was made of the highly toxic metal antimony. Though not as effective a poison as arsenic, its neighbor on the periodic table, antimony has been used to kill. Members of the powerful Italian family the Borgias used it against enemies during the 1400s and 1500s. Accidental poisoning by antimony may have hastened Mozart’s death in 1791; the hypochondriacal composer took large doses of patent medicines, many containing antimony.

[Photo cap]
Today, doctors use antimony-containing compounds against a parasite carried by this sandfly. The disease caused by the sandfly’s bite, leishmaniasis, affects nearly two million people a year.

Scott Camazine/Alamy

The grayish mineral stibnite is the usual source for antimony. Stibnite occurs dissolved in hydrothermal pools (above), in small surface deposits and, more rarely, as large crystals.

The Natural History Museum/The Image Works
Paint bucket
• Ship is repainted constantly

Lead paint was used aboard Cook’s ship; indeed, lead-based paints have been used for thousands of years. Although lead paint was banned for home use in the US in 1978, it’s still found in many older buildings today. As the paint flakes, people can be exposed to this toxic metal; lead makes the flakes taste sweet so children may eat them. And just opening and closing lead-painted windows creates lead dust. Lead is particularly dangerous to infants and children, who may experience developmental and psychological problems over time.

[[pic of old pump]
Starting in the 1920s, oil companies added lead to gasoline to make cars run more smoothly. The practice declined in the 1970s as people saw the effects of lead from car exhaust. The additives were banned in 1996, but many hundreds of thousands of tons of lead1 had already been emitted by then.

Bread
• Served at supper

Various grains, including wheat and rye, can become infested with ergot, the fungus Claviceps purpurea. If bread is made from infested grains, anyone who eats it will feel the powerful toxic effects of the fungus, too. Ergot produces a stew of toxins: some interfere with reproduction, some cause gangrene by constricting blood vessels and some cause writhing, spasms and hallucinations.

[Photo cap]
When ground, ergot becomes a dark reddish powder. It is visible in breads made with white flour; dark breads, especially rye, are usually the culprit in outbreaks of ergotism.

1 http://www.epa.gov/history/topics/lead/02.html
Animal skins

• Taxidermy done aboard ship

Cook’s naturalists relied on arsenic to protect animal skins they had collected for study from being destroyed by insects. Arsenic is a powerful insecticide and was used in the US until 1988. Solutions used to pressure-treat wood for some outdoor construction still contain the toxic element. But picnic tables, play structures and the like can no longer be made with arsenic-treated wood, because getting even small amounts of arsenic on the skin poses some risk.

Tiny bit of white powder in a teaspoon
The fatal dose of arsenic is 100–200 milligrams—less than 1/16th of a teaspoon.

Credit: iStockphoto

[Taxidermy bird]
Taxidermy chemicals created the white ring around this specimen’s eye.
**Medical kit**
*Belongs to ship’s doctor*

The cause of most disease was unknown in Cook’s day, so medics treated symptoms and hoped for the best. One of those treatments, a popular remedy for digestive upsets called calomel, was used well into the early 1900s. Today we would call calomel “mercurous chloride.” Mercurous chloride mainly affects the stomach and intestinal tract. It can cause severe kidney damage, but because it doesn’t easily cross the blood-brain barrier, it wouldn’t have had the neurological effects Cook reported.

*[Pic of Rush]*
In the US, pioneering doctor Benjamin Rush (1745-1813) concocted a large mercury-containing pill as a laxative. The pills were nicknamed “Rush’s Thunderbolts.”

Credit: North Wind Picture Archives/Alamy

**Pufferfish**
*(Lagocephalus sceleratus)*
*Served at supper*

This species of pufferfish, common in waters of the South Pacific, contains the potent nerve poison tetrodotoxin (TTX). TTX molecules, like tiny corks, plug vital channels in nerve-cell membranes. Those channels permit the movement of body chemicals that allows neurons to transmit impulses, so a large-enough dose of TTX causes paralysis. The victim remains fully conscious but cannot breathe. If he or she can be put on a ventilator, the poison’s effects wear off in 24 hours.

*[pic of fugu sashimi arranged like chrysanthemum petals]*

To guarantee diners’ safety, pufferfish— or fugu, as it is called in Japan— must only be prepared by highly-trained chefs.
Congratulations! You went back two centuries and figured out what poisoned Cook and his naturalists!

They just tasted the liver and roe of this highly toxic pufferfish, the silverstripe blaasop.

The pig fared much worse, having fed on table scraps - it was found dead in the morning.

All of the victims were sickened by the nerve poison tetrodotoxin, which is deadly in very tiny amounts, potentially causing paralysis and death by suffocation. The men were lucky they hadn’t eaten more of the fish!

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