# Psittacosis Outbreak on Tristan de Cunha

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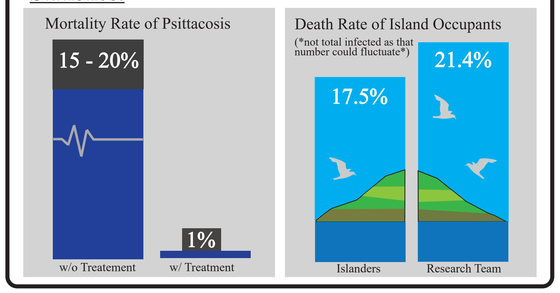
## Case Definition:

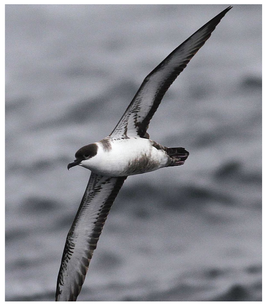
**An outbreak of psittacosis started between December 15 - 25, 1999, with symptoms starting on January 6, 2000 on the island of Tristan de Cunha. As of January 20, 2000, the disease has killed 54 of the 300 people (14 researchers, 286 residents) on the island.**

## Disease:

Psittacosis, a zoonotic disease found in birds, whose symptoms include fever, headaches, myalgia chills, and respiratory diseases. It is caused by the bacteria *Chlamydia psittaci*. In serious cases, pneumonia, hepatitis, and myocarditis are often present, with additional symptoms like shortness of breath, nausea, and vomiting. *Chlamydia psittici* forms elementary bodies, which is the infectious form of bacterium, while in its bird host; the elementary bodies are spread from the bird to the lungs of a human when the human breaths in dust from dried droppings and secretions of the bird. Although uncommon, psittacosis can also be spread from human to human through close contact. Once inside a human's lungs, the body's protective cells try to attack the bacteria by engulfing them, but *Chlamydia psittaci* is a virulent bacterium. Inside the cell, the bacteria transforms into a reticulate body and starts to multiply. After the cells have multiplied, they transform back into elementary bodies and break down the walls of its host cell, killing cell and releasing itself to infect more cells in the lungs. When left untreated, psittacosis is severe and leads to death.

## Statistics:



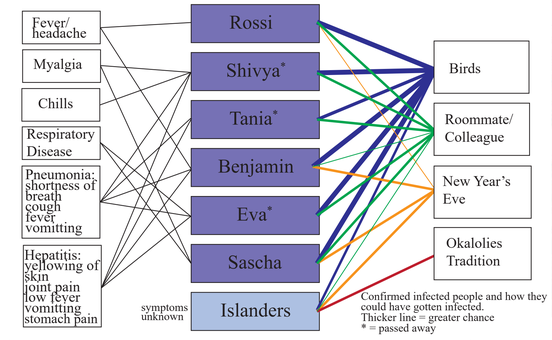



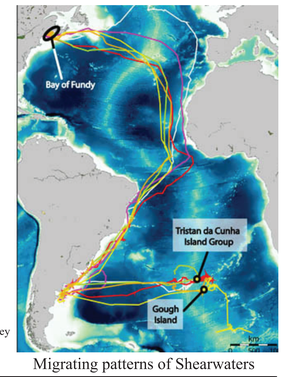
Great Shearwater

## Where and how did it start hypothesis:

The outbreak started when the Shearwater birds contacted the disease during their winter migration, where they go along the coast of South America, where psittacosis originated from, before settling on Tristan de Cunha for the deep winter months. The researchers then contacted the disease while analyzing the migratory birds. The locals then got the disease in one of two ways: some got the disease from the infected researchers during their yearly traditional New Year's Eve celebration with everyone on the island, while others got the disease from the birds while going around the island as "Okalolies." The researchers arrived on the island on December 5 and started showing symptoms around January 4-10. The researchers likely got infected sometime between December 15 - 25, which gives a long enough incubation period as psittacosis takes 5-17 days for symptoms to develop, and symptoms become severe in 1 - 3 weeks. The researchers likely didn't contact the birds until a week or so after arrival as they likely had to get settled and set up research equipment. As of January 20, it is 3 weeks after New Year's Eve, and 51 locals have died and 30 more are showing symptoms.

## Who has been infected?




Migrating patterns of Shearwaters

| Name: | Infected? | Reasons: | Name: | Infected? | Reasons: |
|---|---|---|---|---|---|
| Rossi | Yes | Early symptoms match: fever, inflammation. Room mates with Shivya, who had severe symtoms and died. | Nancy | No | Only symptom is rash on back, does not match psittacosis. Also 71 yrs old, could be from other medical conditions. |
| Shivya* | Yes | Symptoms match with the symptom list. Symptoms started in a time frame (2 1/2 weeks since 12/20) | Bojidar | No | Does not have any symptoms. Should be monitored as incubation period is around 1 - 3 weeks. |
| Jean | No | Only symptoms are postules and rashes, not a symptom of psittacosis, and rashes could be from anything. | Eva* | Yes | Symptoms match those of severe cases: cough, shallow breaths, vomitting, yellowing of skin. |
| Dominick | No | Only symptoms are toe tingles and back pain. Also 53 yrs old, back pain likely from growing age. | Sascha | Yes | Symptoms show early signs of disease: muscle soreness from feeling unwell, and nose flaring from upper respiratory disease. |
| Tania* | Yes | Symptoms match those of severe cases: vomitting, skin has red tint. Symptoms within 3 week of 12/20. | Grace | No | Does not have any symptoms. Should be monitored as incubation period is around 1 - 3 weeks. |
| Ibn | No | Only symptom is diarrhea. Does not match psittacosis. Could be from variety of things, like food poisoning. | Xuanyang | No | Does not have any symptoms. Should be monitored as incubation period is around 1 - 3 weeks. |
| Benjamin | Yes | Symptoms look like early stages of disease: low fever, scratchy could be from lung or throat inflammation. | Mansa* | No | Symptoms don't match: GI issues, pain when walking, rapid pulse. 50 yrs old, could be from growing age. |

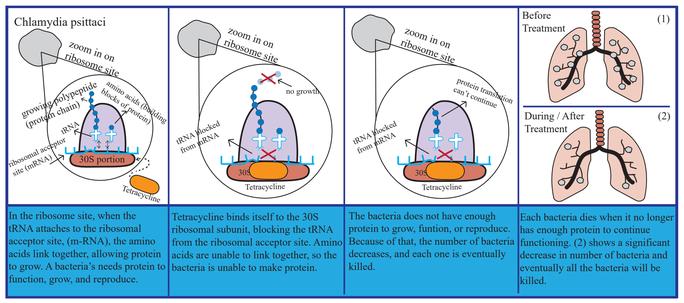
## How to treat it:

Psittacosis is treated with antibiotics, most commonly Tetracycline or Doxycyline. Since there isn't a supply of Doxycyline on the island, Tetracycline will have to be used. Tetracycline should be taken 3 times a day every 8 hours, 1 tablet each dose. The antibiotic works best when taken an hour before a meal or two hours after. Tetracycline treatment for psittacosis should be taken for two weeks and until symptoms have completely gone. Most patients see results within 24 - 72 hours. To treat the 33 people with symptoms on the island, 1386 - 500mg tablets would be needed. But there are only 100 - 500mg tablets on the island, which is only enough for two poeple to get full treatment, with 16 tablets leftover for 'when neccessary' use. Since supplies are limited, a number of factors should be considered when prioritizing who to treat. First, signs of pneumonia and heptitis indicate a severe case, so patients having difficulty breathing, nausea, vomitting, and/or diarhea should be treated first. Psittacosis is also more deadly and more likely to cause lasting effects in older people, so older patients should also be priotized. Following those specifications, Rossi and Sascha should be prioritized in getting treatment, with a little medicine left over for Benjamin. Since its very possible for more people to start showing symptoms in the coming days, alternatives to Tetracycline include Azithromycin (most similar to Tetracycline and alternative to Doxycycline) and Erythromycin, and penicillin in high dosages for some people. If using Azithromycin, one tablet should be taken a day. But since there are only 10 tablets available on the island, it should be used sparingly, or only when a patient starts showing intermediate - severe symptoms. Erythromycin is another alternative that could be used, and it is taken once a day. With 84 tablets available on the island, there is enough to treat 6 people for two weeks. With those drugs, there is enough to 8 people in total, 2 people (Rossi and Sascha) and an additional 6 with Erythromycin. The 16 Tetracycline tablets and 10 Azithromycin tablets should be used in severe cases or emergencies because the use of the two drugs are more similar to the ideal treatment plan. There is hope that the rescue ship will bring supplies on January 28, but until then, medications must be used mindfully.

Both Tetracycline and Azithromycin help reduce bacterial infections by interfereing with the bacteria's protein making functionalities. Protein is made when the 30S and 50S ribosomal subunits interact during protein synthesis to translate mRNA into amino acid chains and protien. When an antibiotic binds to one of the ribosomal subunits, the two are unable to connect and produce protein.

## How does Tetracycline work?

Tetracycline slows down and stops the spread of bacteria: inhibition of protein synthesis by binding to the 30S ribosomal subunit



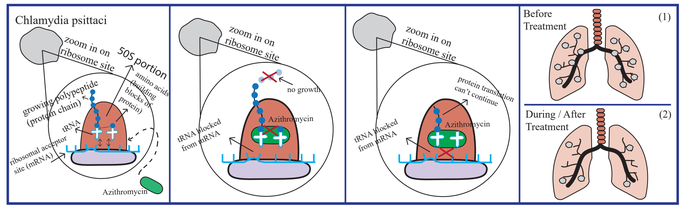

| | | | |
|---|---|---|---|
| In the ribosome site, when the tRNA attaches to the ribosomal acceptor site, (m-RNA), the amino acids link together, allowing protein to grow. A bacteria's needs protein to function, grow, and reproduce. | Tetracycline binds itself to the 30S ribosomal subunit, blocking the tRNA from the ribosomal acceptor site. Amino acids are unable to link together, so the bacteria is unable to make protein. | The bacteria does not have enough protein to grow, funtion, or reproduce. Because of that, the number of bacteria decreases, and each one is eventually killed. | Each bacteria dies when it no longer has enough protein to continue functioning. (2) shows a significant decrease in number of bacteria and eventually all the bacteria will be killed. |

Tetracycline blocks the attachment of aminoacyl- tRNA to the ribosomal acceptor site. Aminoacyl- tRNA is what delivers amino acids to the ribosome for proteins to be made. Result: Bacteria is unable to make protein, which is required for growth and reproduction.

## How does Azithromycin work?

Azithromycin slows down and stops the spread of bacteria: interferes with protein synthesis by binding to 50S ribosomal subunit

Azithromycin works almost in the same way that Tetracycline does. But instead of binding to the 30S ribosomal subunit to stop protein growth, it binds to the 50S subunit.




## PSA Announcement: ATTENTION EVERYONE ON TRISTAN DE CUNHA

We have confirmed the unknown disease going around the island an outbreak of psittacosis caused by the bacteria *Chlamydia psittaci* from the Great Shearwater birds.

- Everyone must stay away from all birds, not just the Shearwaters: they could have passed it to the other birds.
- All infected individuals or anyone feeling sick must isolate themselves and stay inside.
- Everyone who has been in contact with birds on the island or infected individuals must isolate as well. Some people are asymptomatic to this disease.
- Anyone unsure if they are infected or not must isolate themselves for three weeks if no symptoms show, and for two weeks after symptoms disappear if symptoms are present
- Next step if outbreak worsens: island lockdown will be enforced - No one leaves the house. No one leaves the island. No one enters the island. Except for rescue ships arriving on January 28th.

* St. Mary's school is closed starting TODAY and closed until further notice.

* People who work jobs essential to survival (ie. farmer and agriculture) are permitted to keep working their job.

* Healthy individual's whose home is flooded may stay in St. Mary's school for the time being, but will only be allowed to exit the building for things needed to live (ie. get food).

| Flyers with the information above and on medication use will be parachuted across the island tomorrow |

## Containing the disease:

Since psittacosis spreads the easiest through birds to human, a big step in containing the disease and preventing further spread is isolating sick birds. Symptoms of sick birds include diarrhea, ocular discharge, and nasal discharge. However, most birds show very little to no symptoms at all, so isolating sick and infected will not be enough to contain the disease. People should avoid fecal matter from the birds as dust from it carries the bacteria. While human to human transmission is uncommon, it is likely a prominent cause of the spread on the island since symptoms are severe, and the illnesses that come as a result of the infection are contagious, like pneumonia and hepatitis. Therefore, infected individuals should be isolated and quarantined. Since it can take anywhere from 5 days to three weeks for symptoms to show, individuals who have been in contact with the shearwater birds or an infected person also need to quarantine, as they could be carrying the disease without knowing. Since bacteria generally can not live past a few hours in a dead body, the dead bodies can't spread the disease, but should still be buried. A team of healthy individuals should bury the bodies away from populated areas on the island; those individuals must wear personal protective wear, including gloves. During these times, everyone must remain calm and do their best to stay home if possible, especially with the after-math of the hurricane and fire still present. By keeping calm, everyone can help in reducing the spread of the bacteria . The island does happen to have 100 - 120mg tabelts of lexapro and 20 - 30mg tablets of paroxetine (one tablet a day), which could potentially be used help people who have been greatly psychologically impacted by the events and are dealing with a great deal of stress.

## Order of Events / Timeline (within research team)

**12/5/1999** Research team arrive on island

**12/25/1999** Christmas celebrations

**12/15-25/1999** Research team infected

Research team analyze birds

**12/31/1999** New Years Eve Celebration Okalolies Traditions

**1/4/2000** Jean started having postules and rash on ankles

**1/6/2000** Eva started showing symptoms: cough, jaundice, vomitting, shallow breathing, malaise

**1/6/2000** Nancy started having a rash on her back

**1/7/2000** Tania started showing symptoms: vomitting, bewilderment, rapid urination w/ red

**1/9/2000** Shivya started showing symptoms: myalgia, chills, stomach pain

**1/10/2000** Eva passed away

**1/10/2000** Mansa started having GI issues, pain when walking, rapid pulse

**1/13/2000** Sascha started showing symptoms, sore muscles, nose flaring

**1/13/2000** Tania passed away

**1/15/2000** Dominick started having low back pain w/ tingling feeling in toes

**1/15/2000** Shivya passed away

**1/16/2000** Benjamin started showing symptoms: scratchy voice, fever, sleep problems

**1/17/2000** Rossi started showing symptoms: inflammation, fever, drinking lots of water w/ frequent urination

**1/18/2000** Mansa passed away: believed to be due to other reasons

**1/20/2000** TODAY: 55 people dead, 4 researchers, 51 locals, 20 wl symptoms

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