

# Andrée expedition to the North Pole and his crews' mysterious death

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## Solve the mystery:

➤ What is the possible toxicology related reason for his death? Take a guess (or confirm the given diagnosis), and email in your response to be entered into the BCTOX drawing for a \$20 gift card (Deadline: June 20, 2018).

--- There is no right or wrong answer for this competition. You may select a given diagnosis or provide a new one.

- If you send just a diagnosis, you will be entered once.
- If you send the justification of your diagnosis, you will be entered twice.

## Salomon August Andrée

Salomon August Andrée (1854 - 1897) was a Swedish scientist and aviation engineer that attempted to reach the North Pole by hydrogen balloon. His unsuccessful expeditions lead to the death of himself and two crew members.

His life was full of ups and downs, with a final eye-catching story shortly before his passing. He was first employed as a janitor, and subsequently moved towards being promoted to serve as a proud patriot and liberal member of the Stockholm city council. He supported feminism and believed that women's liberty is an inevitable consequence of technical progress.

He has written several inspiring and thought provoking articles. His skills and expansive inspirational mood even acted as an aid to convince Alfred Nobel and King Oscar II to fund his expedition to the North Pole, a noble and magnificent achievement in itself. His ultimate portrayal should have been as a man that defies all odds as it is alleged that three quarters of the mere 1,000 people that have tried to reach the North Pole in the late 1800s died in vein, while the rest failed.<sup>5</sup>

The cold waters and icy lands near the North Pole were enough of a dangerous feat, let alone his accompanied attempt towards a novel travel method: Flight. Even today, the idea seems to be extraordinary and captivating. During his time it would have been "OPG!" as my daughter would say to express her surprise.

## Andrée's expedition

SA Andrée, Knut Frænkel (engineer), and Nils Strindberg (photographer) began their journey to the North Pole via hydrogen balloon on July 11, 1897; this expedition would last a short 3 days. They landed due to mechanical failure, powerful winds, and the freezing of their balloon when heavy rains turned to ice.

At his death, SA Andrée was only 43 years old; Knut and Nils were 27 and 25, respectively. Nils was newly engaged to Anna Albertina Constantia Charlier.<sup>1</sup> It was reported that folk on the ground had spotted an early landing of their balloon less than 3 days after their departure. The balloon finally disappeared into the clouds.

Imagine what a feat it would have been for these men to return to Stockholm shortly, and empty handed, after the alleged expedition of their life. Would these honourable and determined men felt ashamed? They were neither to take their bad luck as a failure nor to quit their journey as they never have done before. Instead, they continued their expedition on icy land, doubling their risk. Andrée's diary notes, which have been successfully preserved in the freezing temperature of the White Island, reveals many hardships, some as far as hunting polar bears for food. Their journey ended in about 3 months. By then, the polar night had begun, portraying 4 months of constant darkness. They were bugged down, simply surviving on tinned and dried foods.



S. A. Andrée and one of his crew with crashed balloon on the pack ice  
(Photo [original] by Nils Strindberg, 1897 that was recovered in 1930)

For several decades his disappearance was subject to mystery and wide speculation until 1930, due to the discovery of a Norwegian Bratvaag Expedition. In 1930 the photographer's body was found buried amongst the rocks, while SA Andrée and his engineer were uncovered in a tent on White Island. He, later, was granted a funeral with great honor and a speech by King Gustav V. An enticing finding by the Norwegian group details paraffin particles in their stove, alongside plenty of matches.<sup>1</sup>

## Cause(s) of Andrée's death

The real reason for their death is unclear, and perhaps unlikely to ever be known, however, speculation ranges from suicide with opium, hypothermia and freezing<sup>2</sup>, fatigue and dehydration, drowning in the case of the photographer, Vitamin deficiency and scurvy, microbial and parasitic causes, and toxic exposures including botulism and carbon monoxide poisoning.<sup>3</sup>

By their final days, the men knew their faith was sealed. However, considering suicide as the cause of death for these brave men who defied the odds is nearly unimaginable. In their era, suicide was considered, not only an unforgivable sin, but also a treachery to the crown across Europe.

### ➤ Trichinellosis

SA Andrée's diary notes indicate digestive problems, illness and exhaustion in all three men. Parasitic infections such as Trichinellosis<sup>1</sup> sourced from eating raw or undercooked Polar bear meats have been proposed as a possible cause of death. Though, Trichinellosis is not as a rapid killer as is presented in all three cases on this expedition. Thus, in my view, it is highly unlikely to be the sole cause of death.

### ➤ Hypothermia

Hypothermia is the first thought the surfaces when reading Andrée's diary and it is a logical possibility.<sup>4,2</sup>

### ➤ Scurvy

Scurvy or severe vitamin C deficiency was a major cause of death until the 17<sup>th</sup> century in sailors. However, the simultaneous death of 3 cases due to Vitamin C deficiency over two months is highly unlikely. Additionally, noticeable clinical findings of scurvy were not documented in these cases.

<sup>1</sup> Trichinella larva lives in muscle tissue of different types of animals including bears. It is caused by roundworms (i.e. Trichinella) and lead to invasion of the intestines and lead to abdominal pain, vomiting and diarrhea at early stages. Later larvae migrates to muscles and causes inflammation with pain and swelling and skin rash.

➤ **Vitamin A poisoning**

Vitamin A poisoning has also been discussed as the cause of their death. Allegedly the men were ingesting the livers of polar bears and seal, which are known to contain high volumes of Vitamin A. However it is highly unlikely that the dose required for lethality occurred in all three of the cases, simultaneously.

➤ **Lead poisoning**

Andrée brought food packed in lead solder cans that may have contaminated his food. In the 1980s, when lead content on the longitudinal axis of his nail was measured, readings ranged from 27 to 486 ppm, with an average of 65 ppm.<sup>3</sup> Based on my experience on occupational lead poisoning and individuals using narcotics tainted with lead whom additionally have high blood lead levels, this toxicity seems to be an unlikely cause of death. It is true that severe lead poisoning could be lethal, but reaching that point requires long-term exposure to elevated lead levels, both of which are not the case for this example.

➤ **Carbon monoxide (CO) poisoning**

Similarities between clinical findings of CO poisoning including fatigue, nausea and vomiting and recorded symptoms of these cases lead to a rise of CO poisoning theories as the main cause of death. Cooking inside their small tent, which was presumably covered in ice, may have led to CO poisoning.

However, as one of his companions was buried, and the two others passed in the tent, it is unlikely that CO poisoning from a failed heating process inside the tent would be the cause of death. Generally, all cases that sleep in closed quarters exposed to high levels of CO pass away fairly simultaneously, without knowledge of the process, making burying one another fairly unlikely.

➤ **Botulism**

Botulism as the cause of death was proposed by Mark Personne.<sup>3</sup> There are several reasons that imply botulism within this story.

*Circumstances and food*

Three previously healthy persons who die more or less at the same time bring poisonings, including botulism, as the cause of death to the top. As canned food and paraffin were found amongst their belongings, their death could be related to food poisoning.

Botulism was more common in the 19<sup>th</sup> century, when this disease was more lethal as botulism antitoxins were not available. Foods contaminated with *Clostridium botulinum* spores that are improperly preserved in low-oxygen conditions will germinate and produce the Botulism toxin. Pickled fish with poor salinity or acidity, smoked, and improperly canned foods are main sources of food botulism.<sup>6 7 8</sup> It is plausible that Andree team's food was not properly prepared or preserved.

*Clinical findings*

Botulism is associated with weakness, blurred vision, dry mouth, gastrointestinal problems and with a rather descending paralysis; it is difficult for the patients to open their eyes, and as the disease gradually progresses, muscles responsible for breathing begin to lose their function, often leading to death. Patients are aware to the last second. I personally recall one of my patients with botulism over 10 years ago, being intubated, unable to breathe – merely having the ability to lightly wave when I visited him in the mornings<sup>6 9</sup>--- He survived in case you are curious!

It is difficult to portray Andree's clinical findings in his last days. However, we know that he was fully aware in his final moments, writing on October 3<sup>rd</sup>, "fortunately, the weather is beautiful and we could work at speed. Nobody had lost the courage. With such comrades, one should be able to figure out under any circumstances."<sup>10</sup>

SA André's diary notes also indicate digestive problems, weakness and fatigue in all three men. These symptoms are consistent with botulism. Documented clinical findings, while being fully alert resembles botulism.



Botulism induced Ptosis (drooping of the upper eyelid due to paralysis), personal photo with permission.

It is not possible to give a diagnosis with a high level of confidence; however, if it were a toxicological reason behind their death, I would have put my money on botulism! This disease alone, or in combination with other problems and hardships related to their trip, may explain their tragic ending.

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**Andrée expedition to the North Pole  
and his crews' mysterious death - Question**

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*What do you think? What could be the potential cause of death for SA Andree and his crew?*

Take a guess, and email back your response to be entered in the BCTOX drawing for \$20 gift card. --- There is no right or wrong answer for this competition. You may select a given diagnosis or provide a new one.

**(Deadline July 20, 2018)**

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