

Aurora Borealis

Reading/discussion

The Aurora Borealis were named by the French scientist, Pierre Gassendi, in 1621 after the goddess of the dawn – Aurora and the god of the north wind – Boreas. Because they are so spectacular, the northern lights have given rise to many myths and legends as well as being the subject of numerous scientific studies. The Makah Indians of the Pacific Northwest thought that the Aurora Borealis were a reflection of huge bonfires lit by people who lived in the polar regions to boil their whale blubber. More scientifically, but equally incorrect, was Aristotle's theory that the lights were the result of vapors rising from the earth and being set alight by the sun.

The first person to figure out what really happens was a 20th century Norwegian physicist, Kristian Birkeland. This is what he discovered: **Charged particles** in the form of both **protons** and **electrons**, called **solar wind**, erupts from the sun in all directions. During **solar flares** these can travel up to 600 miles per second. The earth's magnetic field deflects these **ions** and many stream towards the north and south poles. Once they enter the earth's atmosphere they collide with molecules of **atmospheric** gas and make them glow, producing both the northern and southern lights.

Auroral displays come in a variety of colors – red, yellow, green, blue and violet. The atmospheric gases involved and the altitude at which the display starts both influence the color of the display. Molecules of oxygen glow green and red, while nitrogen molecules cause a blue or deep red glow. The altitude of green lights is usually about 75 to 110 miles, while red lights are generally higher than 75 miles. Blue and violet lights are mostly found at lower altitudes.

The size of the Aurora Borealis can be deceiving. The curtains of light often extend as much as a thousand miles and reach up to 500 miles high, with a width of about one mile.

Name _____

Date _____

Activities:

A. What do you know about the Aurora Borealis?

See if you can answer the following questions without looking at the notes:

1. Who named the Aurora Borealis?
2. Why did he choose that name for the northern lights?
3. Who discovered what really caused the Aurora Borealis?
4. Of what does the solar wind consist?
5. How fast can it travel?
6. What deflects the solar wind towards the poles?
7. What happens when it enters the earth's atmosphere?
8. What two factors influence the colors of the Aurora Borealis?
9. How far can the lights extend?
10. How high can they reach?

B. Crayon Resist.

Now produce your own northern lights by using wax crayons to draw the stars and the shimmering curtains of the Aurora, onto a sheet of white paper. Then use black paint – either water color or diluted tempera – to cover the whole sheet. The wax crayon will resist the paint, leaving you with a picture of the spectacular Aurora Borealis shimmering in the night sky.

Name _____

Date _____

Answer Sheet

Activity A.

1. The Aurora Borealis were named by the French scientist, Pierre Gassendi.
2. He named the lights after Aurora, the goddess of the dawn and Boreas, the god of the north wind.
3. The 20th century Norwegian physicist, Kristian Birkeland discovered what really caused the northern lights.
4. The solar wind consists of ions – charged particles in the form of protons and electrons.
5. The solar wind can travel up to 600 miles a second.
6. The earth's magnetic field deflects the ions towards the north and south poles.
7. When they enter the earth's atmosphere they collide with molecules of atmospheric gas.
8. The two factors which influence the colors of the Aurora Borealis are the altitude and the type of atmospheric gas involved.
9. The lights can extend up to a thousand miles.
10. They can reach a height of 500 miles.

Activity B.

This is an artistic activity and, as such, has no right or wrong application.