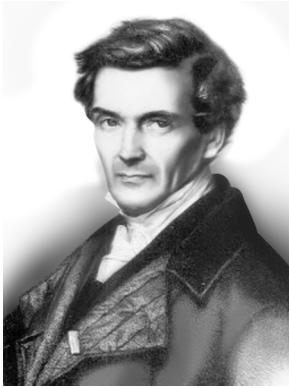




11.2 Gaspard Gustave de Coriolis

Gaspard Gustave de Coriolis was a French mechanical engineer and mathematician in the early 1800's. His name is famous today for his work on wind deflection by the Coriolis effect.

From Paris to Nancy to Paris again



Gaspard Gustave de Coriolis (Kor-e-olis) was born in 1792 in Paris, France.

Shortly after his birth, his family left Paris and settled in the town of Nancy, pronounced *nasi* in French. It was here in Nancy that Coriolis grew up and attended school.

He was exceptionally gifted in the area of mathematics, and took the entrance exam for Ecole Polytechnique when he was 16 years old. Ecole is French for school. Ecole Polytechnique is one of the best-known French Grandes ecoles (Great Schools) for engineering. Coriolis ranked second out of all the students entering Ecole Polytechnique that year.

After graduating from Ecole Polytechnique, he continued his studies at Ecole des Ponts et Chaussées (School of Bridges and Roads) in Paris.

Then Coriolis' dreams of becoming an engineer were put on hold. Faced with the responsibility of supporting his family after his father's death in 1816, he accepted a position as a tutor in mathematical analysis and mechanics back at Ecole Polytechnique. At this time, Coriolis was only 24 years old.

The tutor becomes a professor

Coriolis earned great respect for his studies and research in mechanics, engineering, and mathematics. He published his first official work in 1829 titled *On the Calculation of Mechanical Action*. This same year he became professor of mechanics at Ecole Centrales des Artes et Manufactures. Coriolis became one of the leading scientific thinkers by introducing the terms *work* and *kinetic energy*.

In 1830 he once again found himself back at Ecole Polytechnique after accepting the position of professor. Coriolis went on to be elected chair of the Academie des Sciences, and later appointed director of studies at Ecole Polytechnique.

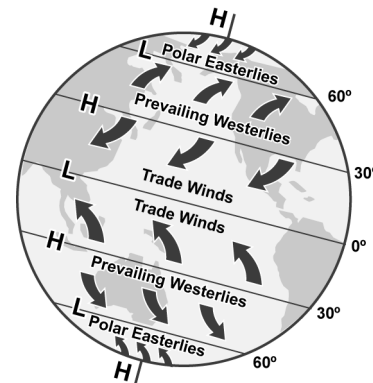
The paper that made him famous

In 1835, Coriolis published the paper that made his name famous: *On the Equations of Relative Motion of Systems of Bodies*. The paper discussed the transfer of energy in rotating systems. Coriolis's research helped explain how the Earth's rotation causes the motion of air to curve with respect to the surface of the Earth.

His name did not become linked with meteorology until the beginning of the twentieth century. He is noted for the explanation of the bending of air currents known as the **Coriolis effect**.

Bending of currents

There are patterns of winds that naturally cover the Earth. The global surface wind patterns in the northern and southern hemisphere bend due to the Earth's rotation.



For example, the Coriolis effect bends the trade winds moving across the surface. They flow from northeast to southwest in the northern hemisphere, and from southwest to northeast in the southern hemisphere.

The Coriolis effect has helped scientist explain many rotational patterns, yet it does not determine the direction of water draining in sinks, bathtubs, and toilets (as some have suggested). However, it does explain the rotation of cyclones.

Gaspard Gustave de Coriolis died in 1843 in Paris.



Reading reflection

1. How did Coriolis's education influence his work?
2. Explain the importance of Coriolis's first book titled *On the Calculation of Mechanical Action*.
3. To understand why Earth's rotation affects the path of air currents, imagine the following situation: You are a pilot who wants to fly an airplane from St. Paul, Minnesota, 700 miles south to Little Rock, Arkansas. If you set your compass and try to fly straight south, you will probably end up in New Mexico! Why would you end up in New Mexico instead of Little Rock?
4. Compare the Coriolis effect in the northern hemisphere with the Coriolis effect in the southern hemisphere.
5. Research the following global surface wind patterns: **trade winds**, **polar easterlies**, **prevailing westerlies**, and explain the Coriolis effect on each wind pattern.
6. Research why Coriolis's work on Earth's rotation was not accepted until long after his death in 1843.
7. Research the other books that Coriolis wrote, such as *Mathematical Theory of the Game of Billiards* and *Treatise on the Mechanics of Solid Bodies*, and explain their scientific impact.