Cartesian diver

More Details

The dancing bottle

When you step on the pedal, the bottle starts to sink, when you release it, it will rise again. Step on it, release it, step on it, release it: Can you make the bottle dance? Why is that?

The pedal pressure compresses everything inside the tube: the water, the bottle and the air inside the bottle. Because air can be compressed more easily than water or plastic (scientists say: a gas is more compressible than a liquid), the air bubble in the bottle is compressed the most. Water can flow into the bottle, it becomes heavier and begins to sink. When you release the pedal, the pressure on the water decreases. The air bubble in the bottle grows in size, pushing the water that was previously squeezed in out again. The bottle becomes lighter and rises to the top.

Can you observe how the air bubble decreases when you step on the pedal and increases when you release it?

Devil in a bottle...

Since the middle of the 17th century, when the Thirty Years' War ended in Central Europe, this kind of diver has existed. At that time, physics was more of an amusement, so the divers were made as little glass devils (Fig. 1).

Even today they are still made as toys. They work like our bottle: there is a hidden opening in the tip of the tail through which the water enters and comes out again. It points to the side, so the little devil can even do pirouettes while diving!

Fig. 1: Glass devil.

...or Cartesian diver

It was not until the 19th century that this marvellous thing was given the name Cartesian diver or Cartesian devil. The term contains a reference to René Descartes (1596-1650). But the great French all-rounder (mathematician, physicist and philosopher) had nothing to do with the little devil. The name was probably only intended to make the product interesting for the educated classes of the time – a real labelling fraud!