Script 1.5

Slide 2

In this unit we will talk about: snowflakes or ice crystals, to be precise

Here you see a water molecule, H2O, a bent molecule, and here you see an ice crystal, or rather a small cutout of a whole ice crystal - the red spheres are oxygen atoms.

The hydrogen atoms are not shown, they lie between the oxygens along these grey rods

And what you recognize is, that these water molecules are arranged in a particular, ordered way, giving rise to this overall hexagonal shape.

And this is the shape of every snowflake - all snowflakes of this planet are hexagonal!

Slide 3

These wonderful photographs show different snowflakes - all look quite different, but all are hexagonal, they have this typical 6-fold rotational symmetry.

You can find even more snow crystals at this website, which is explicitly dedicated to the science of snow and ice crystals.

It also gives an answer to the famous question, if there are two snowflakes alike, which are exactly the same, including all note, if this question is actually a meaningful question.

If you flip through these photographs you will also come across to ice crystals which look like this needle, and you might think, well, is this an exception, is this snow crystal not hexagonal?

The answer is: No, there is not even one exception - because: if you look from above, along the long axis of the needle, you will see that it is a hollow needle with a hexagonal cross-section of the inner wall!

Why do these snowflakes have such a different appearance? Because they grew under different conditions! Their respective specific shapes are mainly dependent on the temperature and humidity of the air layers in which they grow. - Interestingly, the details of this process are so complicated that they are not fully understood yet.
Slide 4

This is one of the reasons why research on snowflakes is still an active area - in this context I wanted to bring this story to your attention: it is a story about the smallest snowflake in the world - can you imagine how many water molecules do you have to put together in order to justify calling it a snowflake?

The answer is: four-hundred and seventy-five!

This was found out very recently by researchers from Germany and the Czech Republic by using infrared spectroscopy.

The transition from an amorphous cluster of water molecules to a stable crystal with a perfect periodic arrangement, only occurs if the crystal consists of roughly 500 molecules at least.

Slide 5

How this transition happens and how a snowflake in general evolves - and of course, how the correspondence principle manifests itself in the case of snowflakes - this will be illustrated in the following 3D animation by Michael in the next unit!