Petra Mischnick is a food chemist who does research on carbohydrates.

Petra Mischnick, *Chemist*

What would have happened if Petra Mischnick had not wallpapered the apartment with her father when she was a child?

Petra Mischnick is a chemist. Besides doing her own research, she is the head of a school laboratory at the Technische Universität Braunschweig.

Professor Mischnick, what is a school laboratory?
Our school laboratory is a chemistry laboratory at the Technische Universität Braunschweig. Here, schoolchildren do research on many exciting things – almost like grown-ups. Mostly, school classes come to us with their teachers. Here they do various projects, for example "Chemistry and Magic" or "On the Trail of the Culprit".

Do you track down real criminals in the school laboratory?
(Ms. Mischnick laughs.) No, we don't. But police detectives depend on chemistry when they investigate crimes. For example, if they're trying to find out if a signature is genuine or counterfeit, in most cases the chemists in a State Office of Criminal Investigation carefully examine the ink. In our laboratory, we show the children exactly how this works. Then they can try it out for themselves.

Did you also do research when you were a child?
I was very curious, and I wanted to find out how things work. For example, I was very fascinated by fire. Of course that was not without risks. That's why a grown-up should always be present when children do experiments with fire.

When I was a child, I spent a lot of time with my father. He worked in a factory and was a very skilled craftsman. For example, he showed me how to make a mirror box so that I could look around corners. I thought that was really exciting!

Agnes Pockels (1862-1935)

The school laboratory at the Technische Universität Braunschweig is named after Agnes Pockels. Although she never went to a university, she received an honorary doctorate in 1931 for her impressive research results on the surface tension of water. Agnes Pockels was a housewife who observed that greasy washing-up water had some special characteristics. As a result, for more than ten years she investigated the surface of water to which she had added various ingredients. She even invented new devices that she used for her research.

When I was about seven years old, I was determined to do a certain experiment: I wanted to find out if people move in their sleep. So before I went to sleep I lay down in a certain position that I could remember very well. I wanted to compare it with the position I was in when I woke up. I thought that if both positions were the same, it would mean I hadn't moved in my sleep. If the two positions were different, I would have moved. I did this experiment countless times, but unfortunately there was no clear result. That's because I discovered that it took quite a long time in the morning before I was really awake and I remembered that I was conducting an experiment. During this waking-up period I moved around quite a lot. And unfortunately I didn't remember a single time what position I had been lying in before I started to move around. In other words, I could not answer my research question. At the time, I was very disappointed. Today I know that researchers have to have a lot of patience. In many cases, we have to think up new experiments again and again before we can answer our initial research question.

Did you also do chemical experiments when you were a child?

Once I wallpapered our apartment with my father. I was especially fascinated by the wallpaper paste. I secretly put a bit of wallpaper paste in a small jar and hid it in the attic; at that time I considered it a very precious treasure. Some time later I looked in the jar again, and I was fairly surprised: it looked as though the wallpaper paste had disappeared. Instead, inside the jar was a kind of small jar made of almost transparent material. At that time I didn't understand what had happened. The new structure must have been made of wallpaper paste, but why did it have the same shape as the jar in which it was formed?

What are you investigating now, Ms. Mischnick?

I am a food chemist. Many food chemists investigate the ingredients of food and the ways these ingredients change when the food is cooked or roasted. Others investigate things we often come into contact with in our daily lives, such as cosmetics, toys and packing materials. One of the important things to watch out for is that these things should not have any ingredients that would make us sick. The ingredients that are chosen must also match the features we want a product to have. For example, if I want to make good wallpaper paste, I have to choose ingredients that will make a thick mass without any lumps.

My working group deals with materials that are chemically similar to starch. Starch is a carbohydrate, and you can find it in grains and potatoes. We investigate and change starches and other carbohydrates and use them to make new materials that are used in industry for many different things, such as washing powder, tablets and construction materials. By the way, the main ingredient of wallpaper paste is a chemically altered carbohydrate!

Now it's your turn!

1 Investigating wallpaper paste

Try out Petra Mischnick's wallpaper paste experiment. Buy wallpaper paste that you can mix yourself from a do-it-yourself store. Mix the powder together with water in a yoghurt cup, according to the instructions on the package. Let the cup stand in a warm place for a while and watch what happens. Note that the experiment may last for several days!

- Think about how you want to make your observations.
- Decide on an observation plan.
- Note your observations and make sketches, drawings or photographs.
- Try to find explanations for your observations.
- Discuss your results with the whole class.

2 Experimenting with starch

Buy cornflour at the supermarket. Take a strong plastic cup or a small plastic bowl and mix the cornflour with water in it until you have a thick paste. Your container should be full of this starch paste to a depth of about two centimetres.

Do the following experiments and compare them with one another.

- **Experiment 1:** Let a spoon slowly sink into the paste. Watch closely and describe what happens.
- **Experiment 2:** Carefully tap on the paste with a spoon.
- **Experiment 3:** Pick up the paste and roll it around in your hand. What happens when you stop rolling it around?

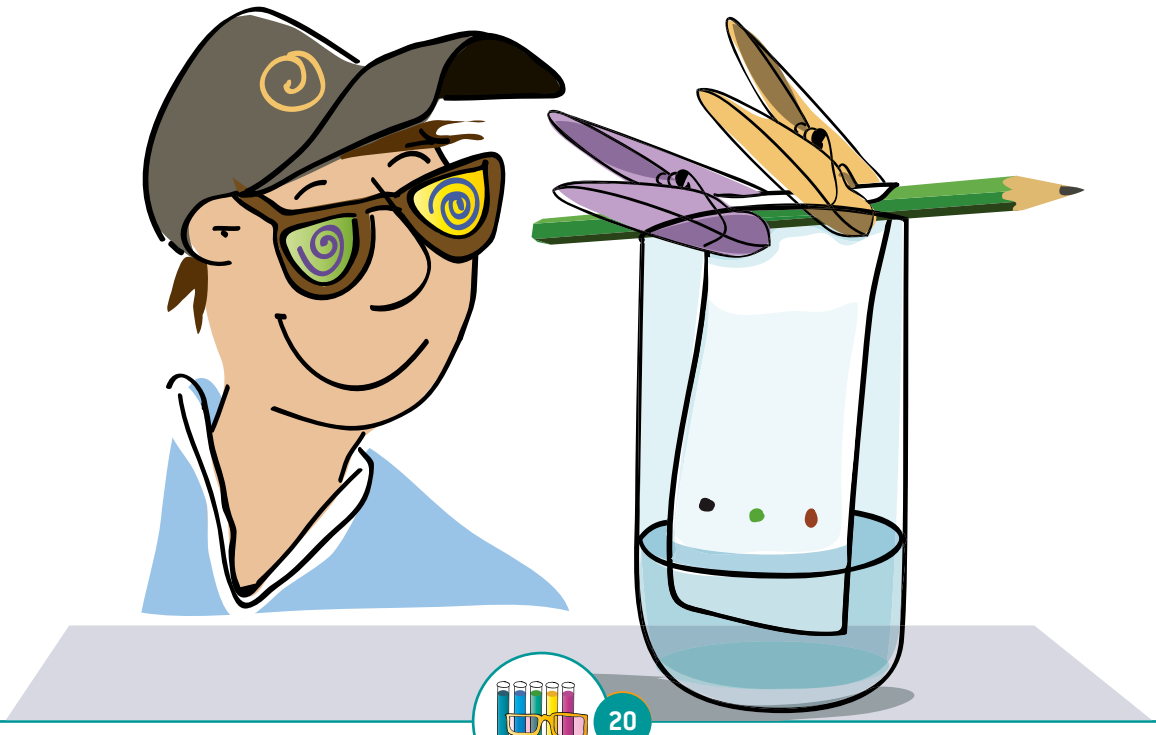
What did you observe? Discuss your results with the class.

3 Comparing felt-tip pen inks

Get the following materials:

- 1 tall water glass
- Several pieces of white filter paper (such as white coffee filters)
- 1 long pencil
- 2 clothes pegs and several felt-tip pens with water-soluble ink

This is how to test the ink: Build a device like the one in the illustration below. Use the felt-tip pens to make a black dot and one or two coloured dots on the filter paper about one centimetre above the



bottom edge of the paper. The dots should be about one centimetre apart from one another. Now attach the filter paper to the pencil with the clothes pegs and hang the pencil carefully across the water glass. The water in the glass should reach to just under the dots on the filter paper. Watch closely and discuss what you have seen.

- Look for explanations of your observations.
- Think about doing experiments with other colours and other arrangements of dots. (It will be especially interesting to compare several different black felt-tip pens.)

4 Design a new experiment

When Petra Mischnick was a child, she wanted to find out if she moved while she was sleeping. Form research teams and think about what you would like to investigate. Design an appropriate experiment and present it to the class. Can you actually do the experiment?

School classes at all age levels do research at the Agnes Pockels School Laboratory.

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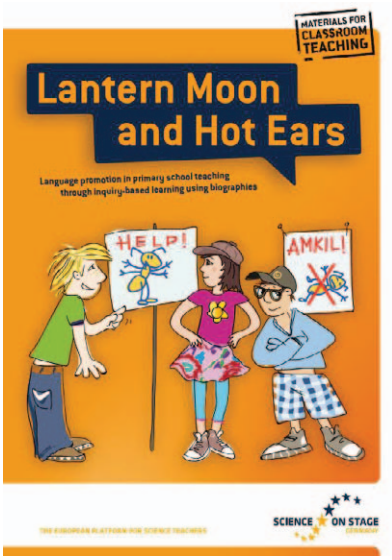

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