

Young Science Project: Inside a Plant Cell



...most life on our planet.

The situation is so serious that governments of all nations and all political parties are now joining forces and financing research to save our planet. One of the most promising projects relies on the latest nano-technologies and will be carried out next week. Felix Baumgartner, who has recently become famous for his space dive, has agreed to go on this new mission that is even scarier and more unbelievable than his jump from the

stratosphere. This time Felix Baumgartner will be shot through a high-energy minimizer that will reduce his physical size to the size of particulate matter, thus allowing him to enter the sick plant cells and find out what is happening inside. Felix Baumgartner has agreed to this extremely dangerous mission, knowing that his life, as well as ours is at stake.

The mission will take place next week. At the moment Mr. Baumgartner is being instructed about the details of plant cells in order to help him navigate through the complex cellular systems that he is going to enter. During his exploration he will be in constant contact with biologists from the WHO research center who will try to interpret his findings and guide him through the maze of cell life.

At the moment scientists are working on ways to help Felix Baumgartner find his way through very different organelles inside the cell. They are also working on a special "space suit" that will allow him to float or slide easily through the different matter that he will encounter.

It has not been decided how Mr. Baumgartner is going to enter the cell: either by breaking the cell membrane and the cell wall or through some natural openings.

Due to the extreme importance of this mission the exploration phase will be broadcast on all TV and radio channels of the world. Scientists will be present in the studios to help interpret and explain the evidence that Felix Baumgartner will find inside the sick cells.

The Mission

Follow your teacher's instructions and come along on a fantasy trip inside a plant cell.

After the Mission:

In the decompression chamber

Imagine you are Felix Baumgartner and have just returned from this dangerous and exciting mission. The process of "nanofication" (i.e. reduction to nano size) has worked as planned but has put considerable stress on your whole body. You have been resized to your normal dimensions but have to stay in a decompression chamber for an hour in order to allow your organs to readjust. Use this hour to write down your impressions in as much detail as possible.

Felix Baumgartner's Notes

What did you see? Describe your path through the cell in as much detail as possible.

- Where and how did you enter?
- How did you move along? Were you pushed or propelled by any currents or other forces? Could you move freely?
- On your mission you have probably entered some organelles. Did you recognize any of them? Did you touch any of the structures? What did they feel like? What textures, colors and materials did you encounter?
- What was going on inside? Did you meet any molecules? Where did they come from and where did they go? Could you recognize any of them?
- Did you hear any sounds? Did you taste any of the materials or liquids?
- Did you find anything unexpected or anything wrong with this cell? Do you have any hypotheses (ideas) what might be wrong with this cell?

These notes are your personal diary and may well contain all your feelings and thoughts as you were travelling through this unknown environment. They will also help you remember all the little details of your impressions for the future interviews with biologists.

In the Newsroom

The world is waiting for the results of Felix Baumgartner's mission. Work in groups of three and **produce a radio-show**. One of you is **Felix Baumgartner**, the other one is a **biologist** and plant cell specialist and the third one is the **journalist** and host of the radio-show. Your radio show will be followed by the general public as well as worried scientists around the globe.

Plan your program in detail.

Make sure we know exactly where you are, who is speaking and what is going on. Don't forget to introduce the program professionally and give a brief overview of the situation. Your audience might not yet be aware of the problem.

What points will be discussed in the program?

What questions will the journalist ask Felix Baumgartner and the biologist? Write down the questions and answers in keywords.

Use the ideas from your diary entries and your biology materials to help you navigate through the structures inside the plant cell professionally.

Use your dictionaries to find fitting words and expressions to describe in detail what you have seen, heard and felt.

What conclusions can the biologist draw from Felix Baumgartner's findings?

Practice your dialog a few times. Do not read your prepared dialog but try to speak naturally to your audience.

Homework: Record the radio-show using **vocaroo.com**. Paste the link to your radio show into Moodle or e-mail it to your teacher so we can all listen to your programs.



Produce a high quality program that you can proudly present to the class and even to a general public.

Notes for the teacher:

Step 1: Students read the newspaper article silently to get an idea about the situation.

Briefly discuss any comprehension questions in the plenary. (10 to 15 minutes)

Step 2: Guided Fantasy: (10 minutes)

Play some relaxation music. (e.g. Klangwelten, Track 2) Guide them through the process of “nanification” and into the cell...

Read the following instructions VERY slowly and give the students plenty of time to develop mental pictures. Have a watch with a second hand ready to help you keep time (otherwise you will rush the learners and they cannot develop any images). Three dots – means a break of at least three seconds.

Put your heads down and close your eyes. ...Relax. ...Begin to focus your attention on your breath. ...All your attention is on one thing, the air entering... and leavingyour nostrils. ...Every time you breathe out you are feeling more relaxed.....

Imagine.. you are inside the nanification bubble....It’s a safe place and you are ready to go on your mission... Your whole body is feeling more and more relaxed ...and becoming more and more shapeless.

Feel your head getting heavy on the desk.....

Feel how the muscles in your neck relax.....

Feel how your arms are getting heavy, ...slow ..and relaxed....

Feel how this relaxation spreads all through your body: your shoulders ...and chest ...are becoming wide and heavy,..... your stomach is relaxed....

This new feeling of heaviness.. and relaxation.. is slowly spreading down through your thighs..., your legs... and into your feet....

Feel how the limits of your body are becoming blurred.... They are slowly becoming fainter and fainter..... until you become almost transparent,.... thin,..... see-through-and weightless, shapeless....

Now the bubble opens and you are going to start your exciting adventure into a plant cell...

Float out of the bubble – gently and slowly and explore what you see around you.....

You are inside the leaf of a plant. Float around among the cells and choose one that you like.(30 seconds)

[now all the breaks must be long – 30 sec or more to allow plenty of time to visualize]

What shapes do they have?

Look around and find a place where you can enter your chosen cell...

You are now inside the cell. Wow What is that?

Look around and explore... you have all the time you need move around....and look...

What do you see.....

Choose one of the organelles around you and explore it more closely....

Touch it and feel what it is like... is it smooth rough.... slimy... wet... dry... prickly...cold... warm... hot..

Move around slowly and carefully and explore...

Is there anything else that is moving in here....

How do you move – do you float --- or swim – or walk... or climb...

Do you feel any pressure – any currents – any winds or drafts pushing or pulling you in any directions....

You have a few more minutes to explore this marvelous place ...

Wait quietly for 2-3 minutes

Now it is time to return....

You slowly move back towards the exit. Do this slowly, gently, carefully – and take in what you see on the way...

You may touch a few more things on the way out –

And look around at the colors of all the objects and structures around you...

You are coming closer and closer to the cell wall and towards the exit.

Squeeze through the exit ... the bubble is waiting for you outside.

In a minute you will be safe inside the bubble and will grow back to your normal size and weight.

You will be back in this classroom, fully conscious and awake—feeling fresh and relaxed.

I am going to count to ten. Join me at the count of ten, opening your eyes at the, feeling fully alert and with full recollection of your adventure.

One... two... three... four... five... six... seven... eight.. nine... ten.

Ask the students to stretch their arms, move their legs a bit and look around in the classroom. Then go to step 3.

Step 3: After the mission: (40 – 45 minutes)

Students write Felix Baumgartner's notes /diaries (individual work, no partner discussion)

Step 4 (another day): 2hrs (a double period)

Students plan their radio shows in detail and practice them.

Step 5: Homework

Groups record the radio shows and share their links.