

**Learning by Ear – General Knowledge, Episode 4****“Why do eggs get hard and potatoes soft when they are cooked?”****Text: Lydia Heller****Redaktion: Maja Dreyer**

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**Directing infos****People:**

Announcer

Jenny: ca. 14-year-old girl

Jack: ca. 15-year-old boy

Jenny's mother Mrs Mulokozi

3-5 "extras" children and adults (for the experiment)

**Locations:** Kitchen in Jenny's house**Atmos / Sounds:**

Cell phone rings, Jack answers

Fast steps running past

Knocking at door

Door opens

Clanking of pots

Opening of taps, filling pot with water

Water boiling

Pots/eggs fall crashing to the floor (making a great noise)

Crashing sound again

Sweeping up broken pieces and mopping up

Crack open hard-boiled eggs and peel them

Soft radio sound in the background ("kitchen atmo")

Murmuring of voices, adults, children

Murmuring of voices, giggling, rustling... "OK"

Stamping, bouncing, people talking across each other, shouting, giggling

*"Ahhh -- I can't hold on anymore!!" // "I'm going to fall" // Let go! // I'm falling too // Careful! Etc etc*

People fall over each other, clapping hands perhaps, a chair falls over perhaps

Humming of voices, giggling, moaning, pushing chairs, straightening of clothes

Fast steps, moving chairs again (people leave)

Voices talking over each other: *"I have to go then" // "I don't have any time left, sorry"// "see you later Jack" etc etc*

Knocking at door, door is opened

**INTRO (Announcer):**

Hello and a warm welcome to another episode of "Learning by Ear's" "General Knowledge" series. Today we're going to hear what happens to eggs and potatoes when they are cooked. That may sound a bit mundane but it's all about physics and bio-chemistry. Jenny can't even make an omelet now without thinking of chemical formulas. Not since she invited Jack for lunch and he transformed her whole family into protein molecules. He was trying to impress them with his knowledge about why eggs get hard when they're cooked while potatoes get soft. All that to make up for the fact that he had completely forgotten Jenny's invitation.

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**1. Scene:**

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**1. Atmo: Cell phone rings, Jack answers**

**Jack:** *(cool)* "Jack speaking, hello? Jenny! Hey what's up?" *(in shock, questioning as if he's been "caught out", answers are cool)* Our meeting? Er, um, er, yeah yeah, of course, it's fine. Oh, today? No, of course I hadn't forgotten -- of course not. You're *already* waiting for me? Half an hour already???. *(stammering a bit)* I'm on my way ... I'll be there any time now... Byeeee!

**2. Atmo: Fast steps running past  
Knocking at door  
Door opens**

**Jenny:** *(angry)* "Finally! Man! I invite you to lunch, I wonder what to cook for weeks, comparing recipes etc etc and

now I've gone shopping and I have been slaving over the stove for hours! And what do you do? You oversleep!"

**Jack:**                    *(conciliatory)* "Oh, come on Jen! I'm really sorry, seriously! *(sniffs)* What's on the menu then?"

**Jenny:**                    *(dry)* "Boiled eggs!"

**Jack:**                    "Boiled eggs?"

**Jenny:**                    *(sheepish)* "Well, that's all I know how to cook and to be honest they're not even ready yet..."

**Jack:**                    *(confused, but still a bit ashamed about having forgotten the invitation, doesn't want to make Jenny feel bad)*  
"Oh, that doesn't matter. Come on, I'll help you. What can I do?"

**Jenny:**                    **(happier again, bustling with activity)**  
"Well, here's a pot and there's water."

**3. Atmo:**                    **Clanking of pots**  
**Opening of taps, filling pot with water**

**Jack:**                    "So I've filled up the pot, put it on the stove and turned on the heat. Let's wait..."

**4. Atmo:**                    **Water boiling**

**Jenny:** "Now it's ready. Let's put the eggs in"

**Jack:** *(shouts, annoyed, outraged!)*

"Stop! For God's sake Jenny!"

**5. Atmo:** **Jenny is caught by surprise**  
**Pot/eggs fall crashing to the floor (making a great noise)**

**Jack:** *(sounding like a science fictional Star Trek-esque character talking about science as if everybody understands what he is saying)*

"If you put eggs into boiling water, heat denaturation immediately disrupts the highly-structured spatial arrangement of protein. The heat breaks down the protein molecules, allowing them to link to other protein molecules. They form new and strong bonds, forcing out the water that surrounds each protein molecule when the egg is liquid. That's why the egg turns hard. The denaturation process is completely irreversible when it comes to eggs."

**6. Atmo:** **Crashing sound again**

**Jenny:** *(disturbed, intimidated)*

"What?"

**Jack:** *(very relaxed)*

"I said the eggs will get hard and they will stay hard."

*(very short pause to take in breath and then an outburst of anger)*

**Jenny:**                    *(really annoyed and angry)*

"LISTEN, ARE YOU MAD? Look at all the mess you've caused! If you don't help me clear it up immediately our friendship is going to break down and I'll make strong new bonds with somebody else and that too will be irreversible!"

**7. Atmo:**                **Sweeping up broken pieces and mopping up**

**Jenny:**                    *(breathes out deeply)* And now tell me again why eggs get hard when they are cooked!

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**2. Scene:**

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**1. Atmo:**                **Crack open hard-boiled eggs and peel**  
                                 **Soft radio sound in the background ("kitchen atmo")**

- Jenny:** *(with her mouth full, munching)*  
„So, Professor? I'm waiting! Why do eggs get hard when they're cooked?"
- Jack:** *(stuffs an egg into his mouth, smacks his lips, swallows)*  
"Well it all has to do with what they are made of -- they're made of protein -- out of protein molecules."
- Jenny:** *(interrupts him, frightened)*  
„Oh nooooooooooooo -- don't start, please! You know what? You've just heard something somewhere and you didn't understand a thing but now you're going on..."
- Jack:** *(interrupts her, unperturbed and sure)*  
"No, this time I *really* know what I'm talking about. I was just watching something on television about egg whites and proteins."
- Jenny:** "Exactly! You just heard it somewhere!"
- Jack:** "Aw Jenny don't be so nasty -- why don't you call your little brother into the kitchen and your sister and your grandma too and the neighbors -- basically anyone who has some time..."
- Jenny:** "Mam! Grannie! Freddy! Could you come here for a second?"

**2. Atmo:           Murmuring of voices, adults, children**

**Jack:**            "That was quick! Hello people! Hello Mrs Mulokozi! This won't last long, I promise -- we're just going to act out how protein molecules react under special circumstances, and in this case how they react to heat."

**Jenny:**           *(annoyed, warning)*

"Oh here we go again -- Ja-acck!"

**Jack:**            "OK OK, I'll be simple! I want you all to imagine this room is a raw hen's egg and we're standing inside the egg white -- that's the albumen if you want to know the scientific term. Each one of us is a protein molecule -- a little particle of the egg white. These particles are all linked to another very loosely and awkwardly. Imagine, for example, that your little finger is somehow linked to your neighbour's -- *(ordering)* well, come on then, do it! Touch your neighbor lightly with your little finger!"

**3. Atmo:           Murmuring of voices, giggling, rustling... "OK"**

**Jack:**            "OK, now we're a loose mass all randomly linked to each other, just like the protein molecules in a raw egg white and we're sweating already and there's a bit of water around us. Egg whites are so gooey and slimy because the proteins are so loosely-connected. But now imagine that the floor is suddenly getting really hot -- just like an egg white would imagine if it was thrown into hot water. What would happen to us in such a

scenario? We would start turning around, jumping, running, faster and faster and (*wheezing, exerted*) higher..."

**4. Atmo: Stamping, bouncing, people talking across each other, shouting, giggling "Ahhh -- I can't hold on anymore!!" // "I'm going to fall" // Let go! // I'm falling too // Careful! Etc etc**

**People fall over each other, clapping hands perhaps, a chair falls over perhaps**

**Jack:** (*very nasal, subdued, he is under the mass of people*)

"So, what's the result? The loose linkages have all disappeared and we're all stuck together on the floor like an immobile dumpling (*fighting his way out groaning*). That's pretty much what happens, Jenny, when an egg is cooked!"

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**Music**  
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**3. Scene:**  
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**1. Atmo: Humming of voices, giggling, moaning, pushing chairs, straightening of clothes (the "mass" is trying to understand what just happened)**

**Jenny:**                    (*very worried, apologetic*)  
"Mama! Here, I'll help you up. Did you hurt yourself anywhere? I'm really sorry, I had no idea Jack, that idiot, was going to do this..."

**Jenny's mum:** (*groaning, reassuring, interrupts Jenny*)  
"I'm fine really I'm fine. (*straightens herself up*)  
Nothing's broken (*groans*) It was actually very interesting -- it's not Common that someone tells me I'm a protein molecule. But Jack?"

**Jack:**                    (*a bit intimidated*)  
"Yes, Mrs Mulokozi?"

**Jenny' mum:**        "What I don't understand is potatoes -- they've got protein in them too -- why don't potatoes get hard when they're cooked? Why do they get soft instead?"

**Jack:**                    (*very cool again and bouncy*)  
"Ha! I know that too! We can do another experiment..."

**2. Atmo:**    **Fast steps, moving chairs again (people leave)**  
**Voices talking over each other: "I have to go then" // "I don't have any time left, sorry"// "see you later Jack" etc etc**

**Jack:**                    (*surprised*)  
"But Mrs. Mulokozi??? Where have they gone all of a sudden?"

**Jenny:** *(dry)* "Maybe they've got another casting session to play the contents of a headache tablet! *(annoyed)* Jack! You're so *embarrassing!*"

**Jack:** *(offended, sullen)*  
"Your mother asked about the potatoes though! Shall I explain it to you at least or don't you want to know?"

**Jenny:** *(resigned)*  
"Go ahead if you must but fast and no experiments this time!"

**Jack:** "Well, your mum was right, there is protein in potatoes but they contain much more starch and when starch is heated by water -- like when you cook potatoes -- then it absorbs a lot of the water and gets really really sticky. The longer you cook a potato and the higher the temperature is, the more sticky and like mash the potato becomes."

**Jenny:** "Because they have so much starch."

**Jack:** "Exactly! *(hesitating)* So are you no longer angry with me? Tomorrow you can come to my place for lunch and not only boiled eggs I promise!"

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**End**  
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**1. Atmo: Knocking at door, door is opened**

**Jack:** *(a bit mother-like, chiding)*

"Well, it's about time Jenny! Why did it take you so long? I've been slaving over the stove for ages..."

**Jenny:** *(apologetic)* "Oh Jack, I'm sorry really! *(sniffs)* What's on the menu then? It smells great!"

**Jack:** "Erm -- boiled potatoes. That's all I know how to cook and to be honest they're not even ready yet."

**OUTRO (Announcer):**

Well, nobody has asked either Jack or Jenny to cook since then! The writer of today's episode was Lydia Heller. Thank you for listening and be careful if you decide to try out the experiment for yourselves! If you want to listen to the program again or find out more about the science of everyday matters, visit our website [www.dw-world.de/lbe](http://www.dw-world.de/lbe). That's all for now but don't forget to tune in next time!