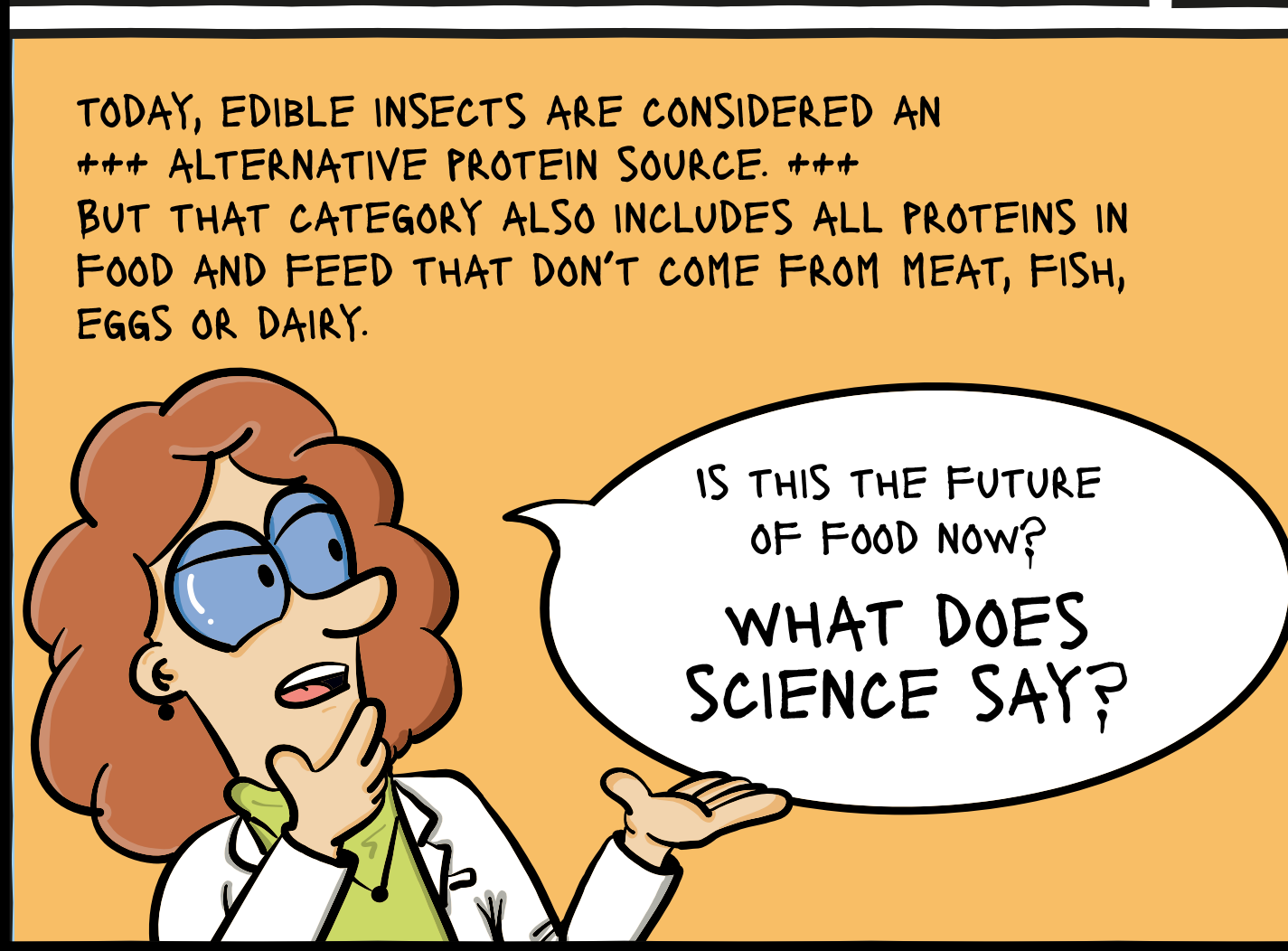
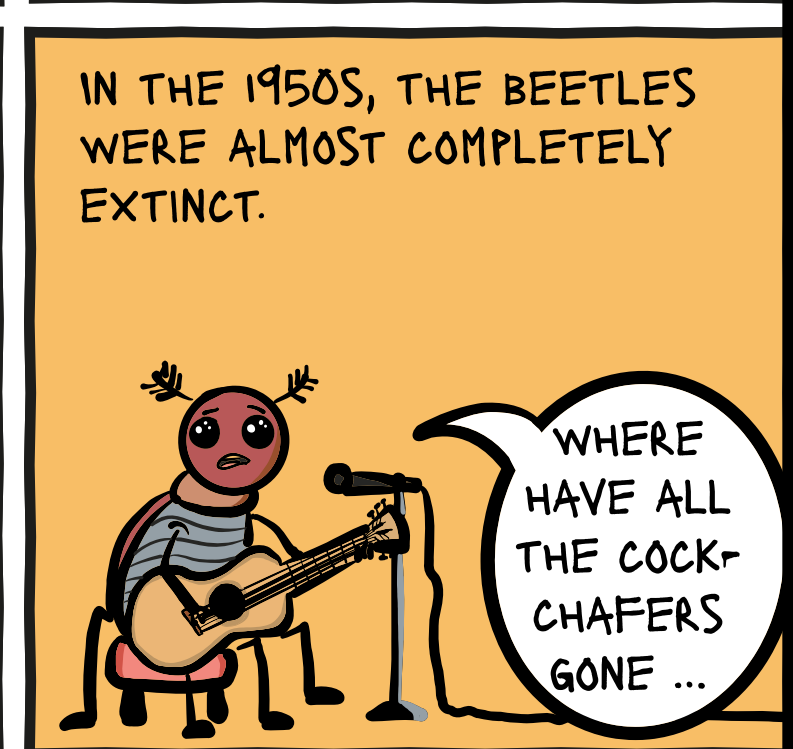
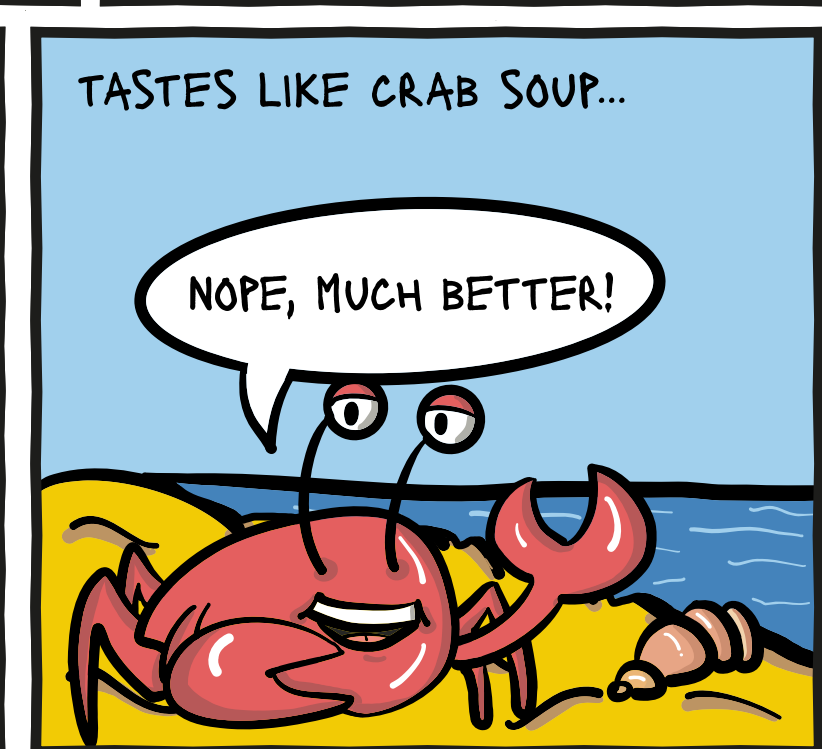
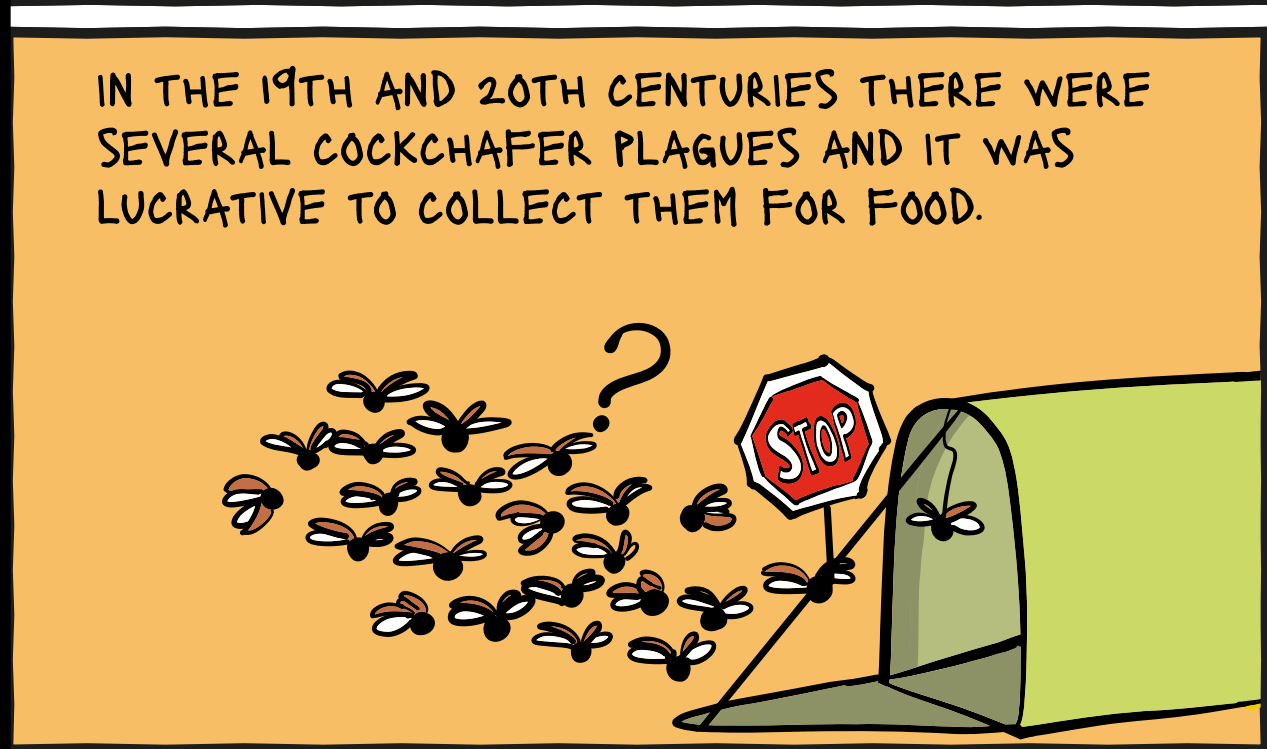
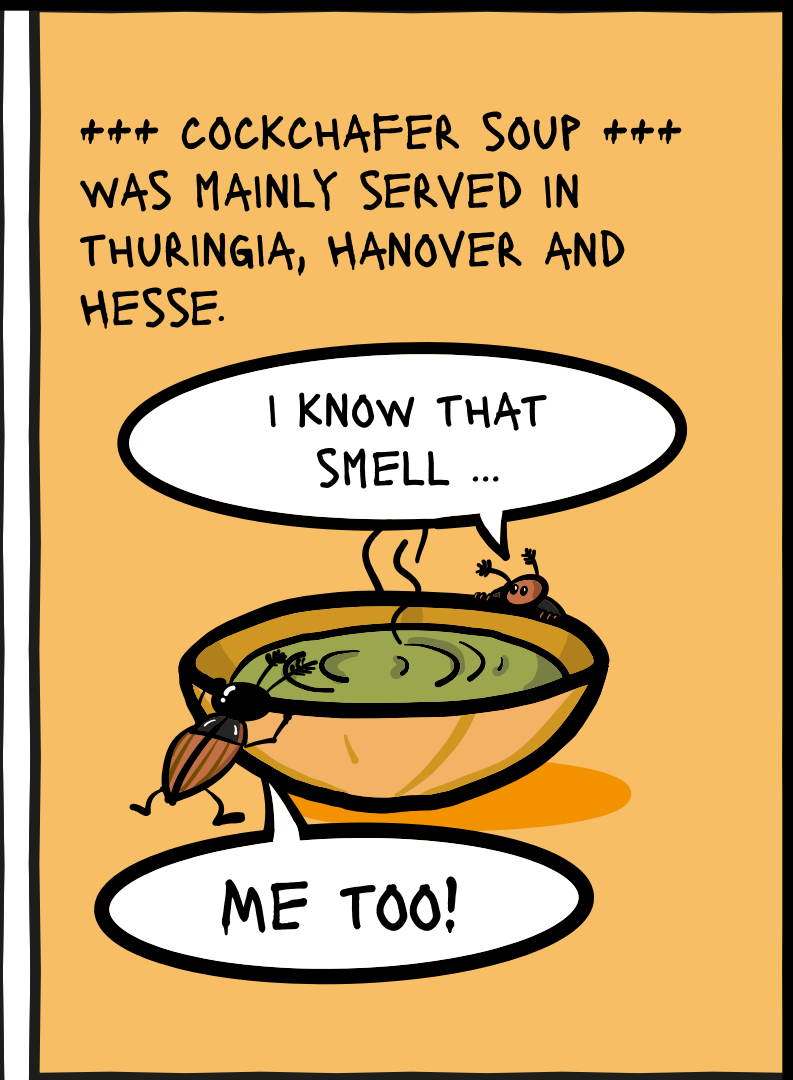


ALTERNATIVE PROTEIN SOURCES

WHAT DOES
SCIENCE SAY?

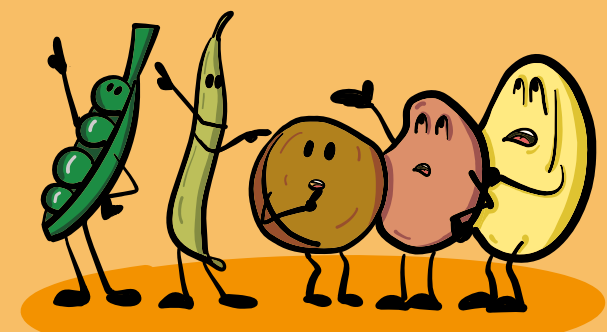
THE BfR SCIENCE COMIC





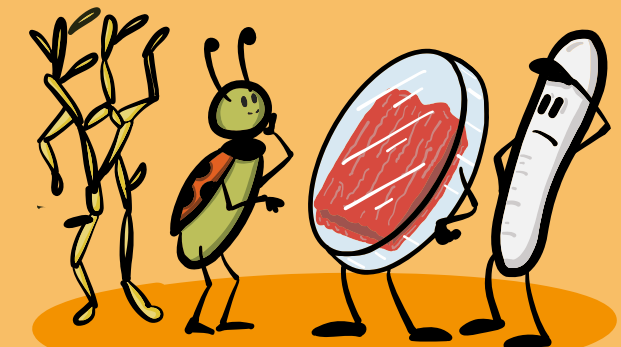
ALTERNATIVE PROTEIN SOURCES

COMMON ON THE E.U. MARKET



- PEAS
- BEANS
- LENTILS
- SOY
- LUPINS

NOT COMMON ON THE E.U. MARKET YET



- MYCOPROTEIN BIOMASS
- INSECTS
- CULTURED MEAT
- MICROORGANISMS

PROGNOSES POINT TO A DEFICIT IN THE GLOBAL SUPPLY OF PROTEIN AVAILABLE TO THE WORLD'S GROWING POPULATION. THIS COULD BE OFFSET BY ALTERNATIVE PROTEIN SOURCES.*

EXCUSE ME, DOCTOR!?

THE ECOLOGICAL FOOTPRINT OF SEVERAL ALTERNATIVE PROTEIN SOURCES SUCH AS INSECTS IS FAR SMALLER THAN FOR CATTLE OR PIGS.

THAT'S EXACTLY RIGHT! AND **WHY?** SHOOT!!!

OUR PLEASURE!

* SOURCE: BFR FAQ ALTERNATIVE PROTEIN SOURCES, (NOV. 2024), https://www.bfr.bund.de/en/lupins_insects_or_lab_grown_meat_what_is_the_current_state_of_health_risk_assessment_for_alternative_protein_sources_319953.html (ZUGRIFF: 2/12/2024)

GLOBAL PROTEIN DEMAND WILL INCREASE BY 75% BY 2050.**

Alternative Protein Sources

LESS LAND AND WATER IS NEEDED FOR PRODUCTION AND THEY PRODUCE LESS GREENHOUSE GAS THAN CONVENTIONAL LIVESTOCK FARMING.

** SOURCE: REPORT FOR HIGH-LEVEL EXPERT FORUM „HOW TO FEED THE WORLD 2050“, (OCT 2009), FOOD AND AGRICULTURE ORGANISATION OF THE UNITED NATIONS (FAO), https://www.fao.org/fileadmin/templates/wsfs/docs/ISSUES_PAPERS/HLEF2050_INVESTMENT.PDF (ACCESS: 22/11/2024)

LEGUMES SUCH AS PEAS, BEANS, LENTILS AND SOY HAVE BEEN ESTABLISHED AS PLANT-BASED ALTERNATIVE PROTEIN SOURCES HERE FOR SOME TIME. NOW, THIS ALSO INCLUDES LUPINS ...

MYCOPROTEINS FROM FUNGI ARE ALSO BEING USED IN PROCESSED MEAT SUBSTITUTES. IN ASIA AND AFRICA MICROALGAE ARE AN IMPORTANT SOURCE OF PROTEINS.

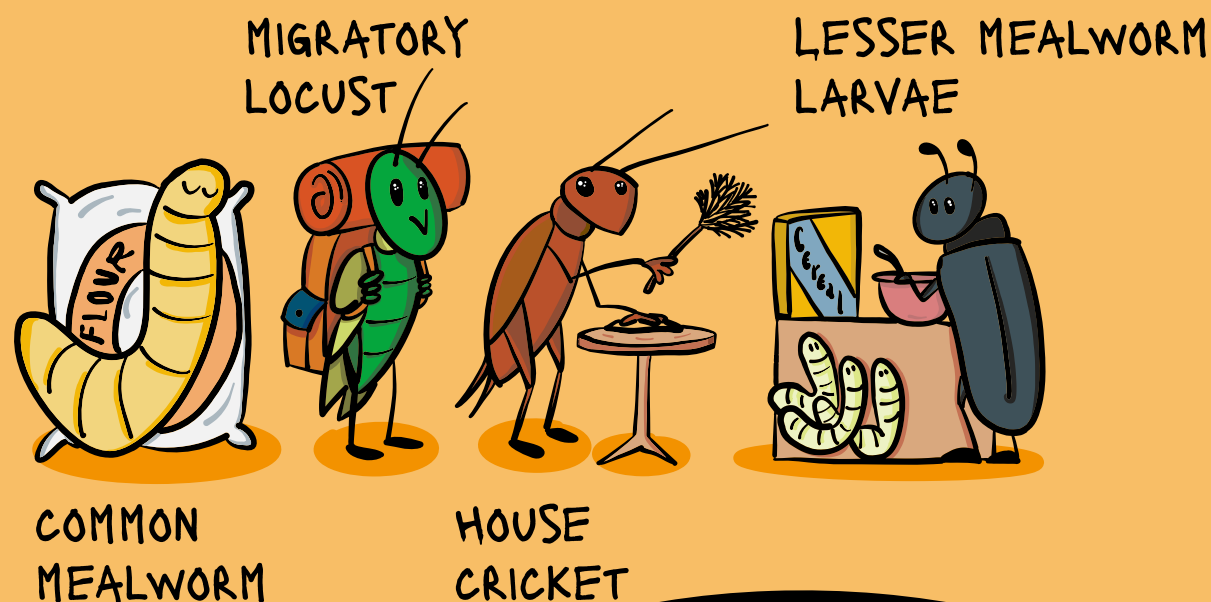
... WHICH HAVE THE HIGHEST PROTEIN CONTENT OF ALL DOMESTIC LEGUMES.

WOW! WHAT ABOUT INSECTS AND CULTURED MEAT?

*** INSECTS ***

BUGS CONVERT THEIR FOOD VERY EFFICIENTLY INTO PROTEIN THAT IS VALUABLE TO HUMANS.

SO FAR, SEVERAL INSECT SPECIES HAVE BEEN APPROVED FOR FOOD PRODUCTION IN THE EU.

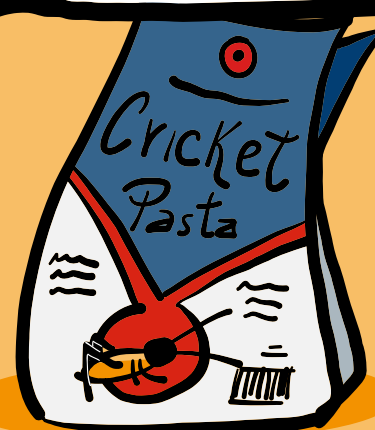


DEPENDING ON THE CONDITIONS OF AUTHORISATION, INSECTS MAY BE USED IN, FOR EXAMPLE, DRIED, FROZEN, PASTE-LIKE OR POWDERED FORM.

MORE INSECT SPECIES ARE APPROVED FOR LIVESTOCK FEED. THEY MUST ALSO BE PROCESSED INTO FLOUR OR PELLETS, FOR EXAMPLE.

AROUND 1,900 INSECT SPECIES ARE CONSUMED WORLDWIDE.*

*** GOOD NEWS; THE INGREDIENTS LIST HAS TO DISCLOSE IF A PRODUCT CONTAINS INSECTS. ***



INGREDIENTS;
GLUCOSE
COMMON MEALWORM
(TENEBRIO MOLITOR)
SUNFLOWER OIL

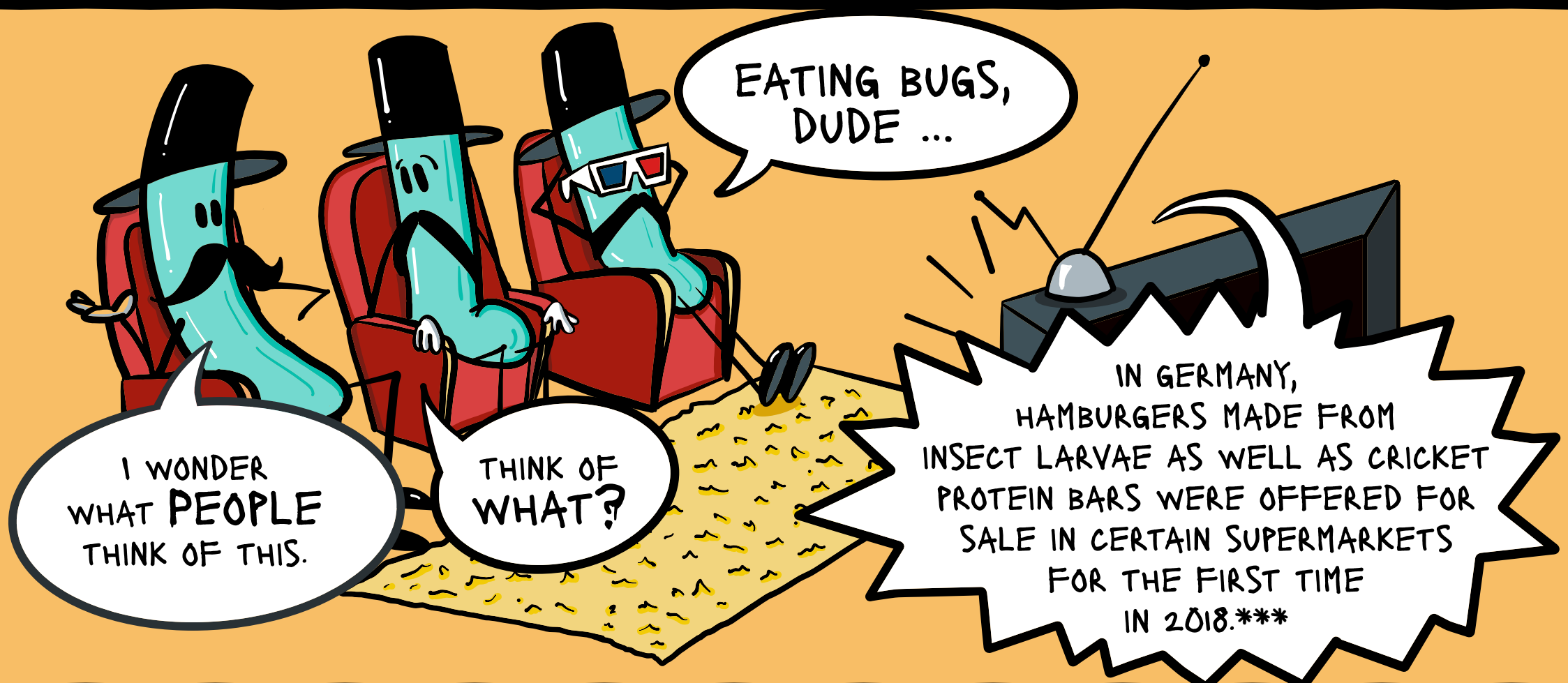
UNPROCESSED INSECTS MAY ONLY BE USED AS PET FOOD.

* SOURCE: 'WORM UP TO THE IDEA OF EDIBLE INSECTS - FOUR REASONS WHY EDIBLE INSECTS ARE GOOD PROSPECTS FOR FOOD SECURITY AND LIVELIHOODS, FOOD AND AGRICULTURE ORGANISATION OF THE UNITED NATIONS (FAO), (SEP 2022), <https://www.fao.org/newsroom/story/-/worm-up-to-the-idea-of-edible-insects/en>, (ACCESS: 22/11/2024)

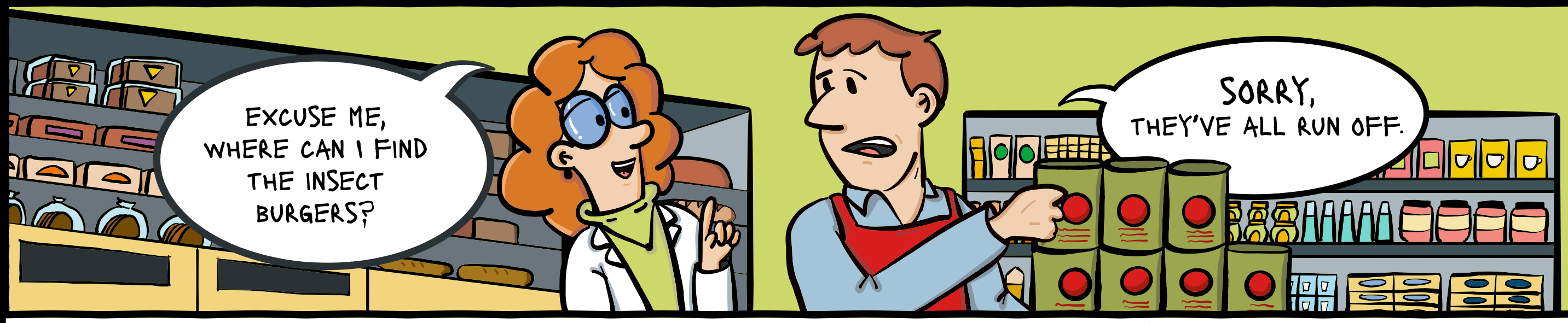
*** CULTURED MEAT ***

THIS MEAT IS GROWN FROM CULTURED STEM CELLS EXTRACTED FROM A SMALL SAMPLE OF ANIMAL MUSCLE TISSUE.

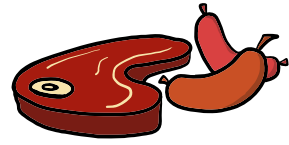
IN SINGAPORE, CULTURED MEAT IS ALREADY ON THE MARKET.
IN THE U.S. AND ISRAEL THERE ARE INITIAL APPROVALS, BUT NO PRODUCTS ARE ON THE MARKET YET.



*** SOURCE: INSEKTENBURGER, PASTA & CO; WAS IST AUS DEM TREND MIT LARVEN UND GRILLEN GEWORDEN? BUSINESSINSIDER.DE/GRÜNDERSZENE, (JUL 2021), <https://www.businessinsider.de/gruenderszene/food/insekten-trend-lebensmittel-2021-02/>, (ACCESS: 22/11/2024)

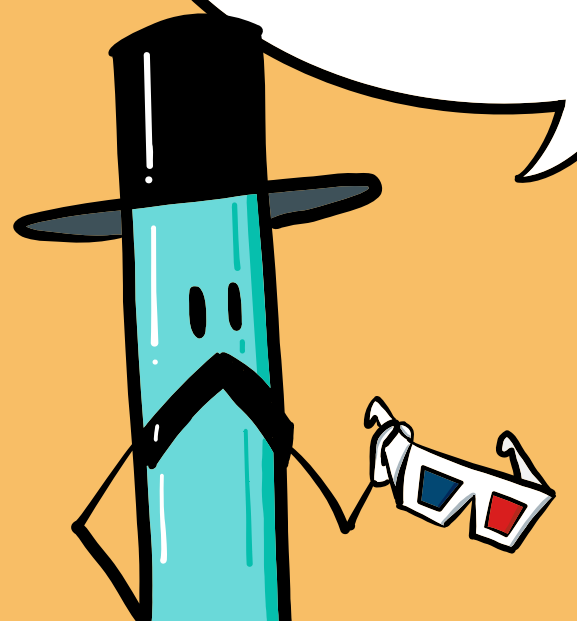


BUT;
PEOPLE IN GERMANY
ARE OPEN TO PROTEIN
SOURCES THAT AREN'T
TRADITIONALLY
MEAT-BASED.

WHICH FOOD CATEGORIES DO YOU TYPICALLY CONSUME ON A DAILY BASIS? **			2016	2024
FRUITS & VEGETABLES			74%	71%
DAIRY PRODUCTS			59%	62%
MEAT & SAUSAGES			34%	23%
VEGAN + VEGETARIAN ALTERNATIVES TO ANIMAL PRODUCTS			22%	10%
FISH & SEAFOOD			1%	1%

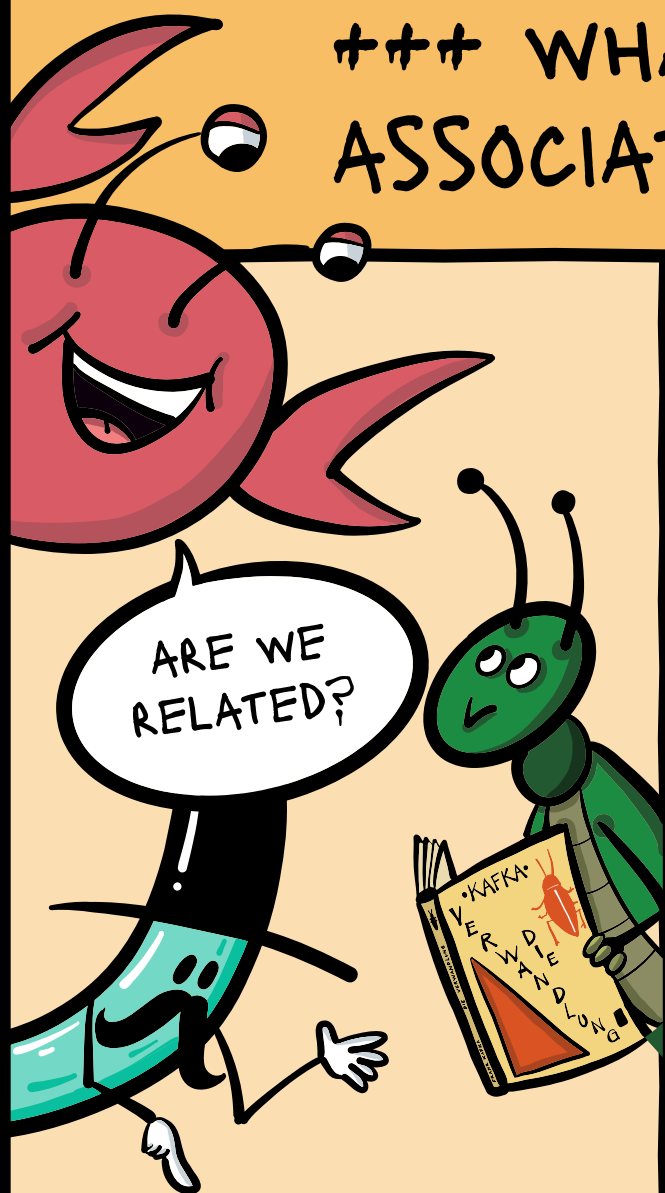
** SOURCE: SAMPLE: 1,001 REPRESENTATIVE GERMAN CITIZENS AGED 14 YEARS AND OLDER, FORSA NUTRITION REPORT 2024, ON BEHALF OF BMEL.

ALTHOUGH
THE CONSUMPTION OF
PLANT-BASED PROTEINS
CONTINUES TO INCREASE,
CONSUMERS IN EUROPE ARE
+++ **SCEPTICAL** +++
OF EATING INSECTS.*



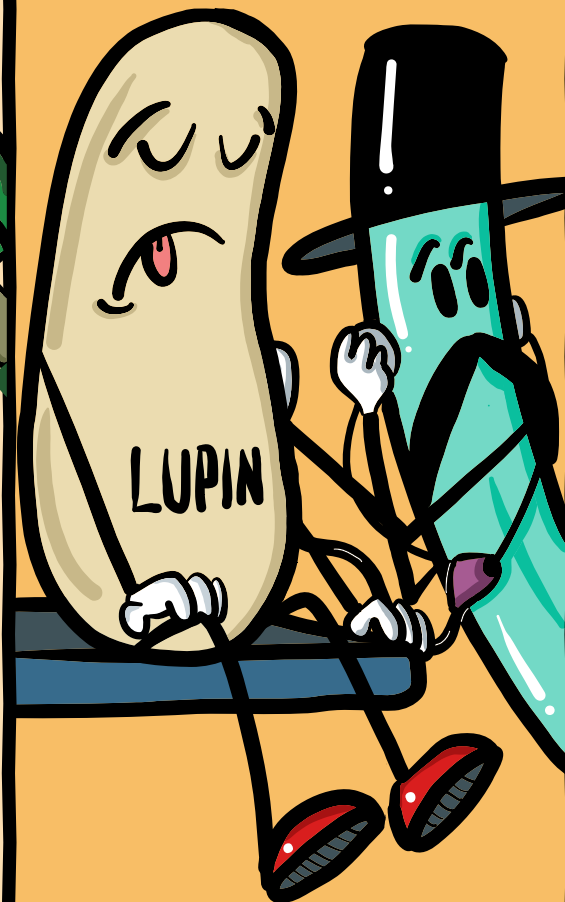
* SOURCE BFR FAQ ALTERNATIVE PROTEIN SOURCES, NOV. 2024, https://www.bfr.bund.de/en/lupinus_insects_or_lab_grown_meat_what_is_the_current_state_of_health_risk_assessment_for_alternative_protein_sources_317453.html, (ZUGRIFF: 2/12/2024)

+++ WHAT IS KNOWN ABOUT POTENTIAL HEALTH RISKS ASSOCIATED WITH ALTERNATIVE PROTEIN SOURCES? +++



MICROBIOLOGICAL RISKS

NOVEL PROTEIN SOURCES MAY CONTAIN BACTERIA, VIRUSES OR ...



... OTHER MICROBIOLOGICAL CONTAMINANTS.

INADEQUATE PROCESSING OR HYGIENE DEFICIENCIES CAN INCREASE THE RISK.

ALLERGIC REACTIONS (CROSS REACTIVITY)

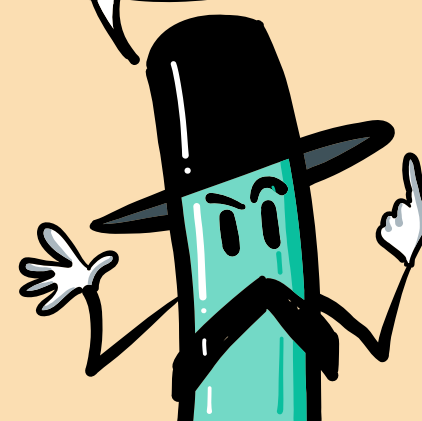
PEOPLE ALLERGIC TO CRUSTACEANS, DUST MITES AND MOLLUSCS MAY EXPERIENCE ALLERGIC REACTIONS TO INSECTS AS WELL, DUE TO THEIR VERY SIMILAR PROTEINS.

CONTAMINANTS

THEY CAN ACCUMULATE UNDESIRABLE SUBSTANCES SUCH AS HEAVY METALS, PESTICIDES, OR CHEMICALS, E.G. IF THEY COME FROM CONTAMINATED AREAS.

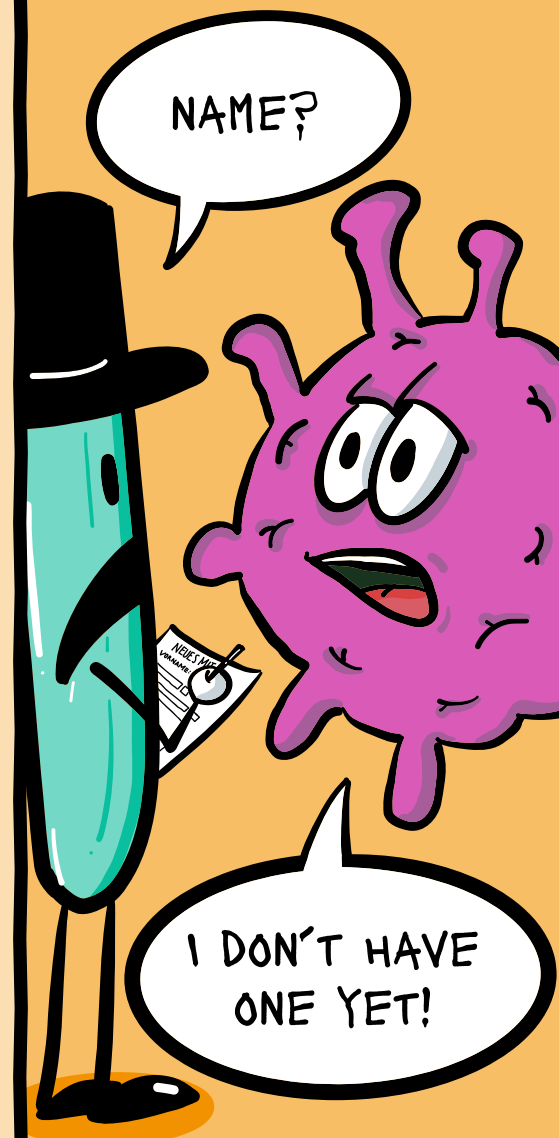


TOO MUCH HEAVY METAL!



UNKNOWN TOXINS

THIS APPLIES PARTICULARLY TO EXOTIC PLANTS OR NEWLY DISCOVERED MICROORGANISMS.



NAME?

I DON'T HAVE ONE YET!

PROCESSING

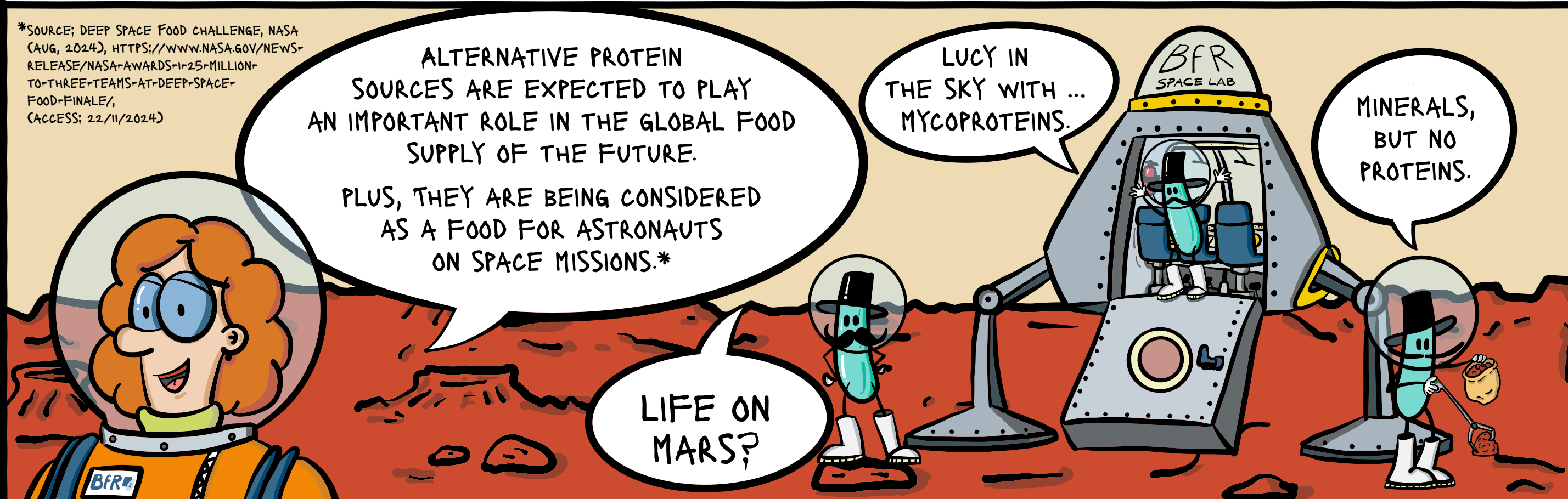
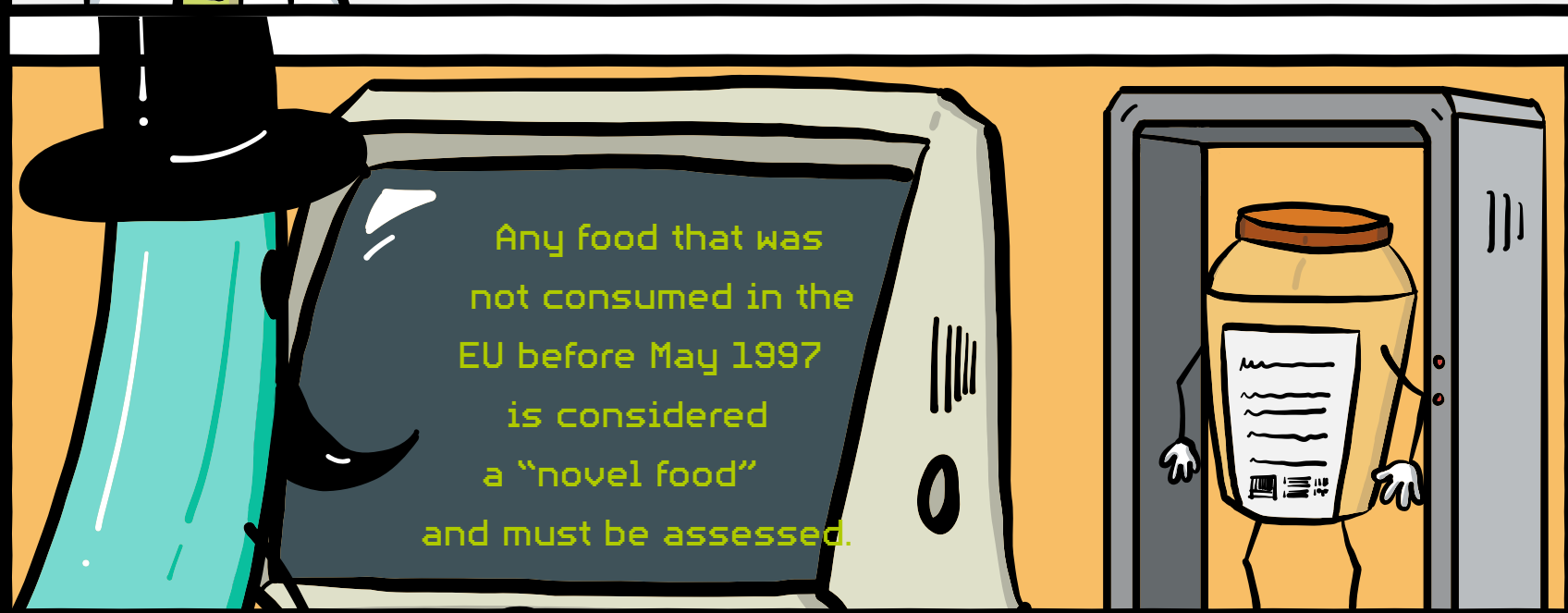
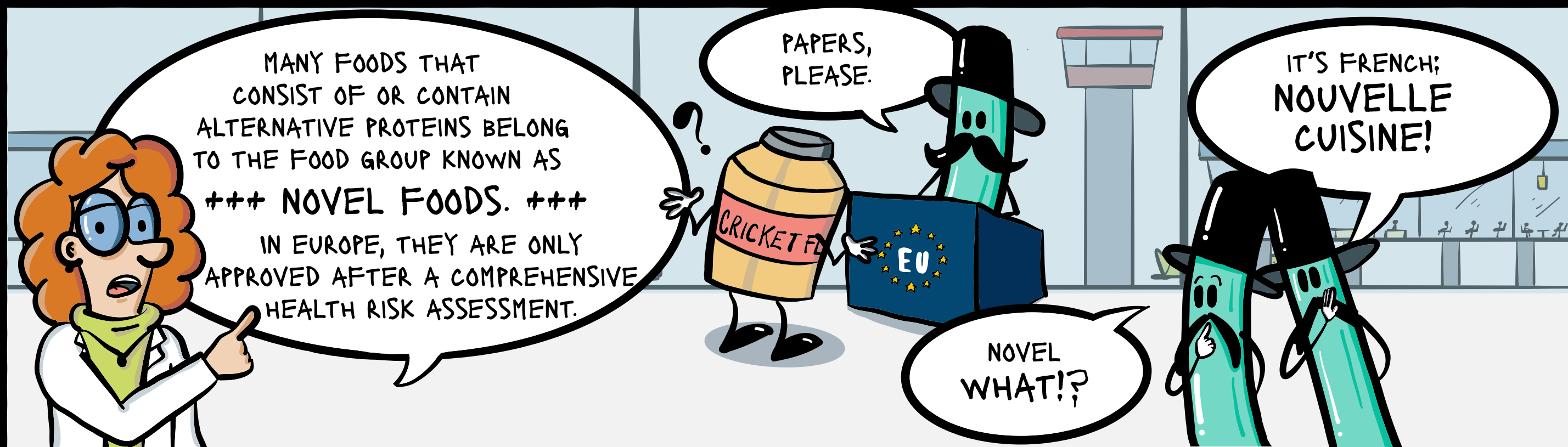
PROCESS CONTAMINANTS MAY BE FORMED DURING PRODUCTION.



THE BFR IS TASKED WITH ASSESSING EXISTING HEALTH RISKS AND IDENTIFYING NEW ONES.

THIS ALSO INCLUDES DEVELOPING TESTS ON THE ALLERGENIC POTENTIAL OF ALTERNATIVE PROTEIN SOURCES.





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About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH). It protects people's health preventively in the fields of public health and veterinary public health. The BfR provides advice to the Federal Government as well as the Federal States ('Laender') on questions related to food, feed, chemical and product safety. The BfR conducts its own research on topics closely related to its assessment tasks.



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Protecting Health**

