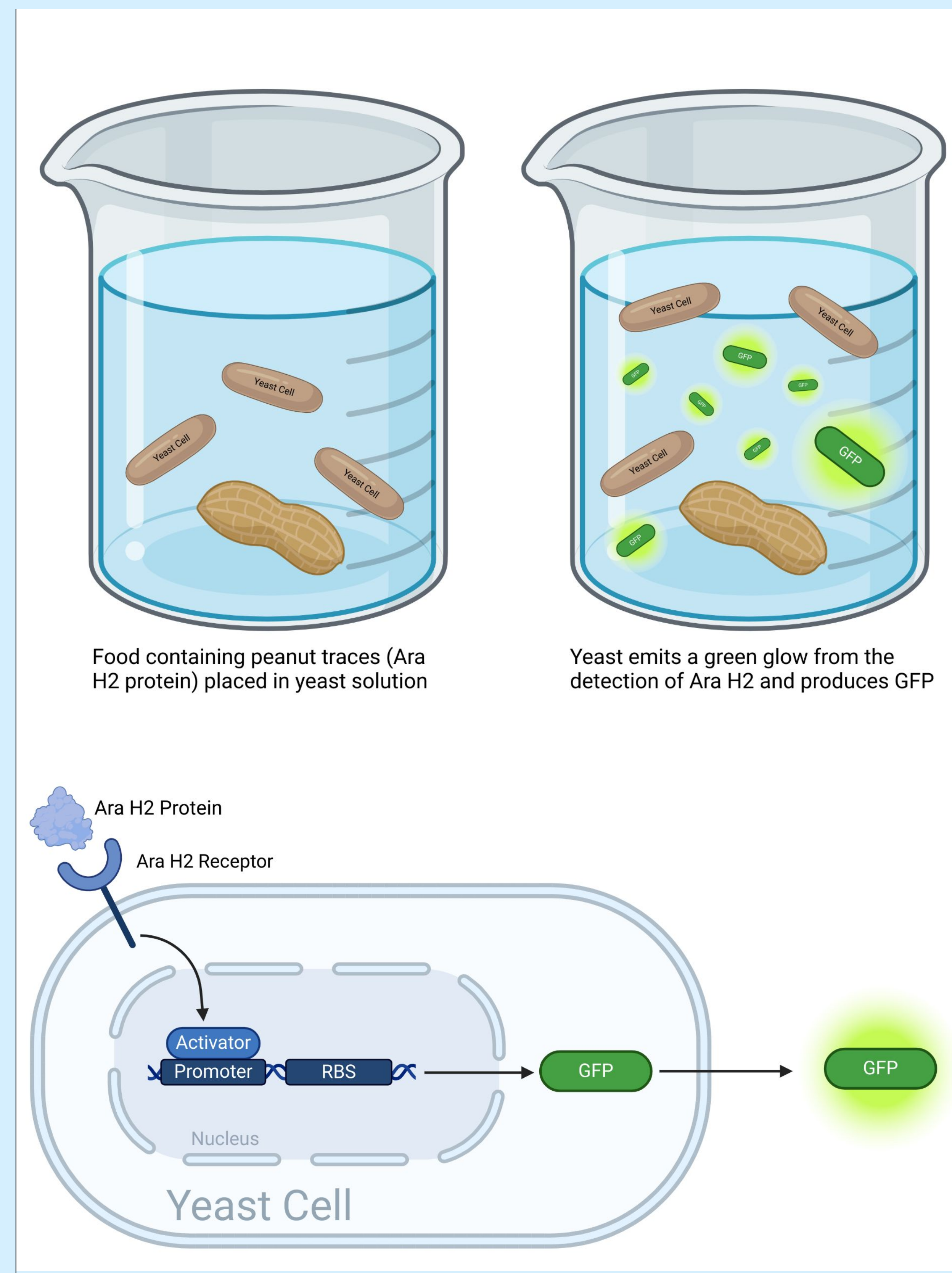


Abstract: To provide certainty to protect this vulnerable population, our project intends to create a portable biosynthetic biosensor and bioreporter for the detection of peanut traces in food samples by detecting the allergenic protein in peanuts: Ara-H2. Using a yeast cell because of its compatible cell membrane with our synthetic receptor, our team engineered a yeast cell modified to produce green fluorescent protein (GFP) upon detection of the antigen Ara-H2. This extracellular detection would then signal the gene circuit, including the activator, promoter, and ribosome binding site, to begin transcription to create GFP. The yeast cell would then output GFP as a visual indication of the detection of peanuts. Because the gene circuit for the production of GFP is only activated when the engineered receptor detects the allergen, the visual signal will only be produced if peanuts are present, making this an effective solution to detect peanut allergens.

Background: The peanut allergy is among the most common allergies for adults and children worldwide, putting approximately 160 million individuals in danger everyday and compromising the health of millions. The current reliance on ingredient lists and oral confirmation to determine the inclusion of peanuts is unreliable and subjective by nature. We will use synthetic biology approaches to engineer an Ara-H2-responsive biosensor capable of producing a visible green fluorescent protein(GFP) signal if it detects the peanut protein's presence in a food sample.



Team Content:

We are a new BioBuilders team from Montrose School, consisting of six high school members.

Next Steps:

- To advance our project further, we would need to identify the specific components of our Ara-H2 receptor, possibly incorporating the Ara-H2-reactive monoclonal antibody (mAB) to detect the allergen.
- We intend to create an experiment to test if the engineered yeast cell will react to the Ara-H2 and would then produce GFP. We will experiment with various amounts of Ara-H2 allergen to determine the reactivity of the yeast cell solution. Similarly, we will measure the amount of GFP released from the yeast cell during each trial to determine the magnitude of the visual signal.

References and acknowledgements

References:

https://docs.google.com/document/d/1_Y0-2oOjhhfK2s9xg-FiyIHATvOT6ubLcMFprxp4ouI/edit

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