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Butterfly Adaptive Mechanism

- Butterflies use their feet for their sense of taste/smell
- They are able to sense the presence of toxins on leaves
- If they sense toxins on a plant, they will not lay their eggs there, because their offspring will eat the leaf when they hatch
- If toxins are present, the offspring will die



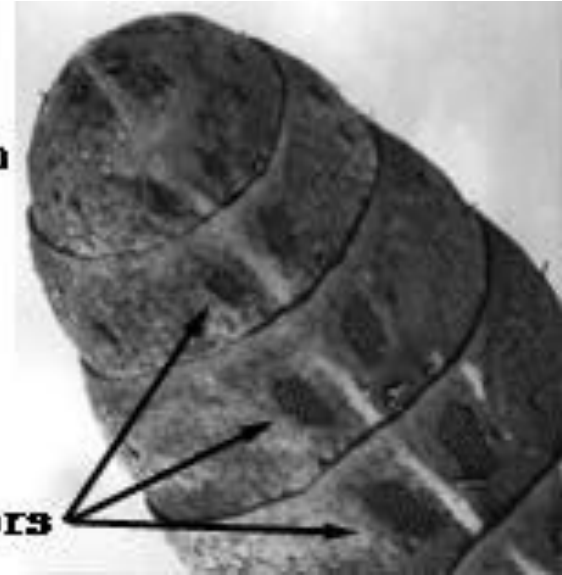
But How Does That Work?

Butterfly feet have cells called chemoreceptors.

The chemoreceptors react to the presence of chemicals on the leaves. If the cells react to the chemicals on the leaf and sense a toxin, the butterfly knows not to lay its eggs there.

**SEM photo
of the tip
of a Monarch
antennae.**

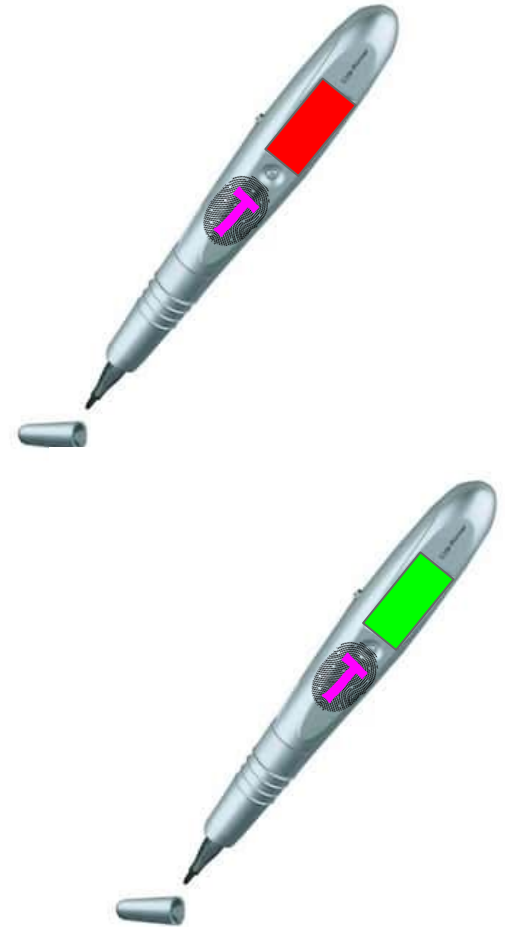
**Dense
clusters of
chemoreceptors**



Our Product: TarsisTouch aka T-Touch

Our pen is used to identify different allergens in foods.

- The pen will use a disposable paper tip that uses nanoparticle particle technology allergen molecules in food.
- The computer system inside the pen will be programmed to recognize the reading from the paper tip to recognize different allergen molecules.



Function of Pen

Steps:

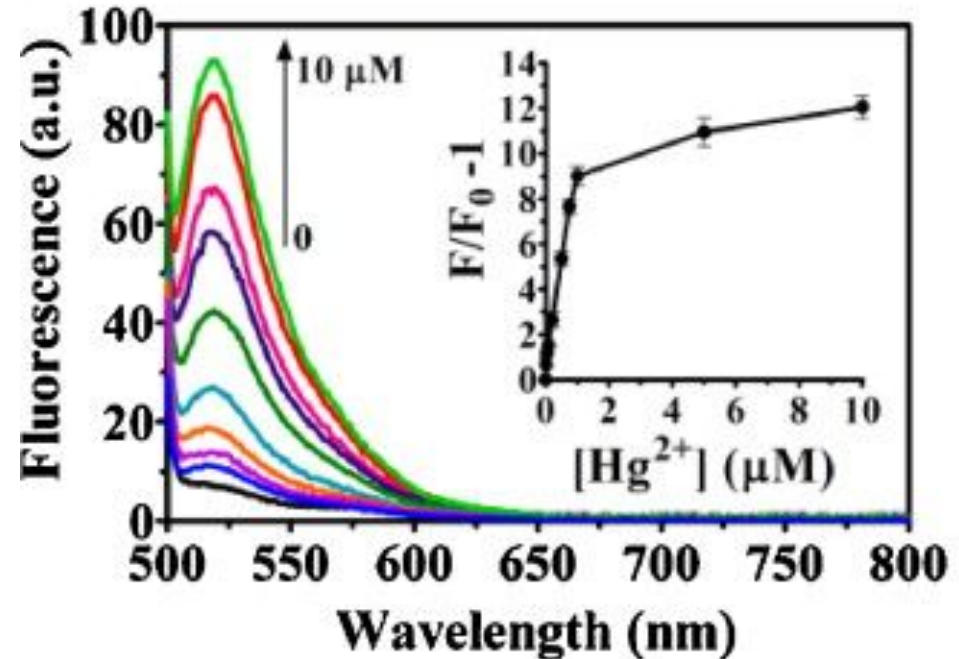
1. User can touch the paper tip of the pen to any food.
2. User should hold the pen on the food item until the red or green light appears.
 - a. Red = allergen detected
 - i. DO NOT EAT
 - b. Green = no allergen detected
 - i. Safe to eat
3. Dispose of tip using easy release button.



But How Does it Work?

Detection of Allergens:

- The disposable paper tips are printed with “upconversion nanoparticles”, which are basically copper ions fixed to paper
- The molecules in the food will attach to the copper ions, and a florescent light in the pen shines on the nanoparticles
- Based on the amount of florescent light that reacts to the molecules, individual molecules can be recognized by the computer as either an allergen molecule or not

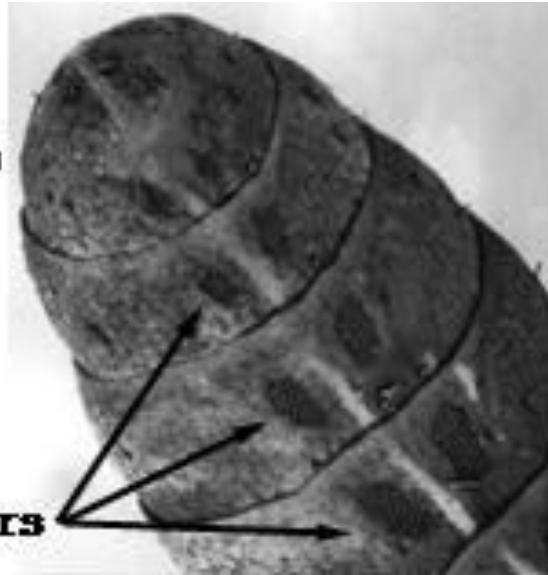


But How Does it Work? Cont.

Computer System of Pen:

- When first getting the pen the user must go onto the app to identify the allergens they want to be detected.
- The information from the app syncs with the pen via bluetooth.
- The computer receives information about molecules that are present in the food from the nanoparticles and fluorescent light readings.
- Based on the information, the computer identifies the allergens that may be present.

**SEM photo
of the tip
of a Monarch
antennae.**



**Dense
clusters of
chemoreceptors**

Identification of
allergens/toxins: will
help user determine
safety of food



Nanoparticles on
disposable tip (acting
as chemoreceptors)

Materials

- Base of pen and cap: plastic
 - Durable
 - Washable
 - Cap-safety between uses
- AAA batteries
- Specially printed paper
 - Contains the nanoparticles
- Baseboard/Computer component
 - Light sensor
 - Bluetooth capabilities
- Glass display screen



Constraints

- Longevity of sensor technology
 - How long will the paper tip last?
 - How will repairs to the fluorescent light, screen or computer be achieved?
 - Manufacturing issues: is this a generic product or specialized health stores?
- Technology changes
 - Be able to adapt the computer technology to the different types of smartphones.
 - Update the technology/ computer system via bluetooth, like an iPhone
- Learning curve to test the food
 - Being able to accurately test the food in multiple spots to be able to identify the allergen in the whole food item.
- Cost
 - Insurance would cover part of the cost of the pen, as they do usually for EpiPens and the like

Applications



- Students with allergies could bring the pen to school, so that they know whether cafeteria food or other shared treats are safe to eat.
- Caretakers can use the pen to ensure they are feeding loved ones foods without allergens.
- Adults with allergies can use the pen to manage their health independently.
- Could be used to help desensitize people to allergens by helping them expose themselves in small doses.

Benefits

1. Safety in school cafeterias and classrooms
2. Peace of mind of caretakers of people with severe allergies
3. Eventually the technology could be updated to also detect the AMOUNT of allergen present, so microdosing can be managed successfully
4. Could replace the need for EpiPens by detecting the allergens before ingestion

Criteria

- Perform trials on the allergens isolated
- Perform trials on the allergens mixed with other NON-ALLERGEN food
- Perform trials on allergens combined or multiple allergens in one food

Our T-Touch Pen will be successful IF:

The display indicates ONLY if the allergen(s) selected on the online platform is detected in each of the above trials