Animation Script

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Can microalgae improve honeybee health?
Dr Vincent Ricigliano

To make the most out of this script, you could:

- Stick it in your book as a record of watching Vincent's animation
- Pause the animation and make notes as you go
- Add your own illustrations to the sheet
- Create your own animation to accompany it
- Add notes from classroom discussions
- Make notes of areas you will investigate further
- Make notes of key words and definitions
- Add questions you would like answered – you can message Vincent through the comments box at the bottom of his article: **www.futurumcareers.com/can-microalgae-improve-honeybee-health**

SCRIPT:

Thanks to their work as pollinators, bees play an essential role in agriculture, contributing to one third of our food supply. Bees visit plants to feed on their nectar, for energy, and their pollen, for nutrients. In the process, they transfer pollen between flowers, which fertilises them and results in the fruits, nuts and seeds we eat.

Billions of bees are transported around the US every year, following the flowering schedule of different crops. In February, commercially managed colonies of honeybees are taken to California to pollinate almond trees, before being driven to the Pacific Northwest in March to pollinate cherries and apples. At the beginning of April, they are transported across the country to Maine for the blueberry season, before heading to Florida at the end of April to pollinate oranges and lemons. In May, the colonies are taken to the Dakotas, where the bees spend the rest of the year producing honey from clover fields.

However, bees thrive on diverse diets containing nectar and pollen from a variety of plants. The modern agricultural practice of monocropping, in which a single species of crop is grown over a large area, means that bees can only feed on a single plant species at a time. This means they do not get the range of nutrients they need to stay healthy. As a result, many bees suffer from malnutrition, so beekeepers must feed their bees with pollen substitutes to supplement their diet.

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At the US Department of Agriculture's Honey Bee Breeding, Genetics, and Physiology Research Laboratory, Dr Vincent Ricigliano is improving the health benefits of pollen substitutes. He is developing pollen substitutes from tiny plants known as microalgae. These microalgae contain important fats and proteins, and so provide the bees with essential nutrients.

Vincent also uses gene editing techniques to create new genetic strains of microalgae that improve the bees' immune systems by training them to fight diseases. He calls these 'edible vaccines', as when bees eat them, not only do they receive all the nutrients they need, but they also are protected against specific diseases.

Vincent's microalgae pollen substitutes and edible vaccines have promising potential to improve bee nutrition and health, helping the bees who are so vital for providing the food we eat.

What could you achieve as a molecular biologist?