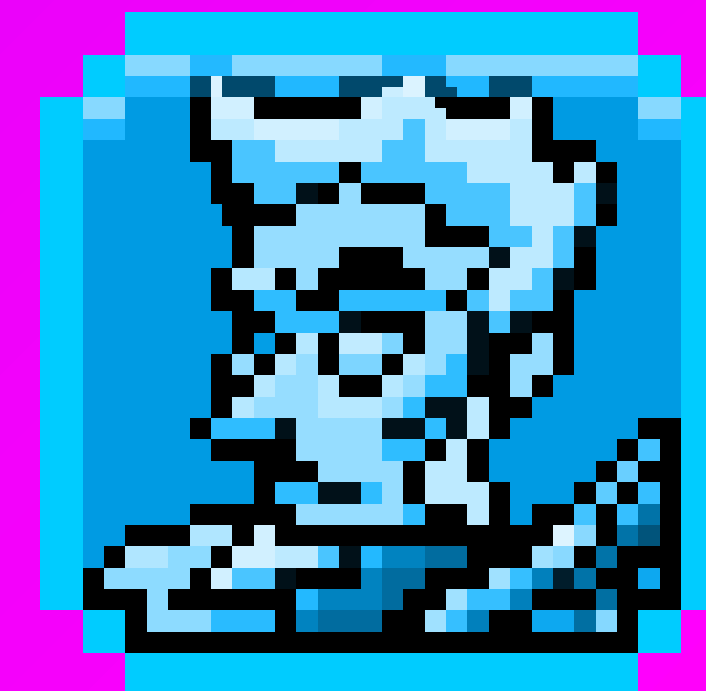


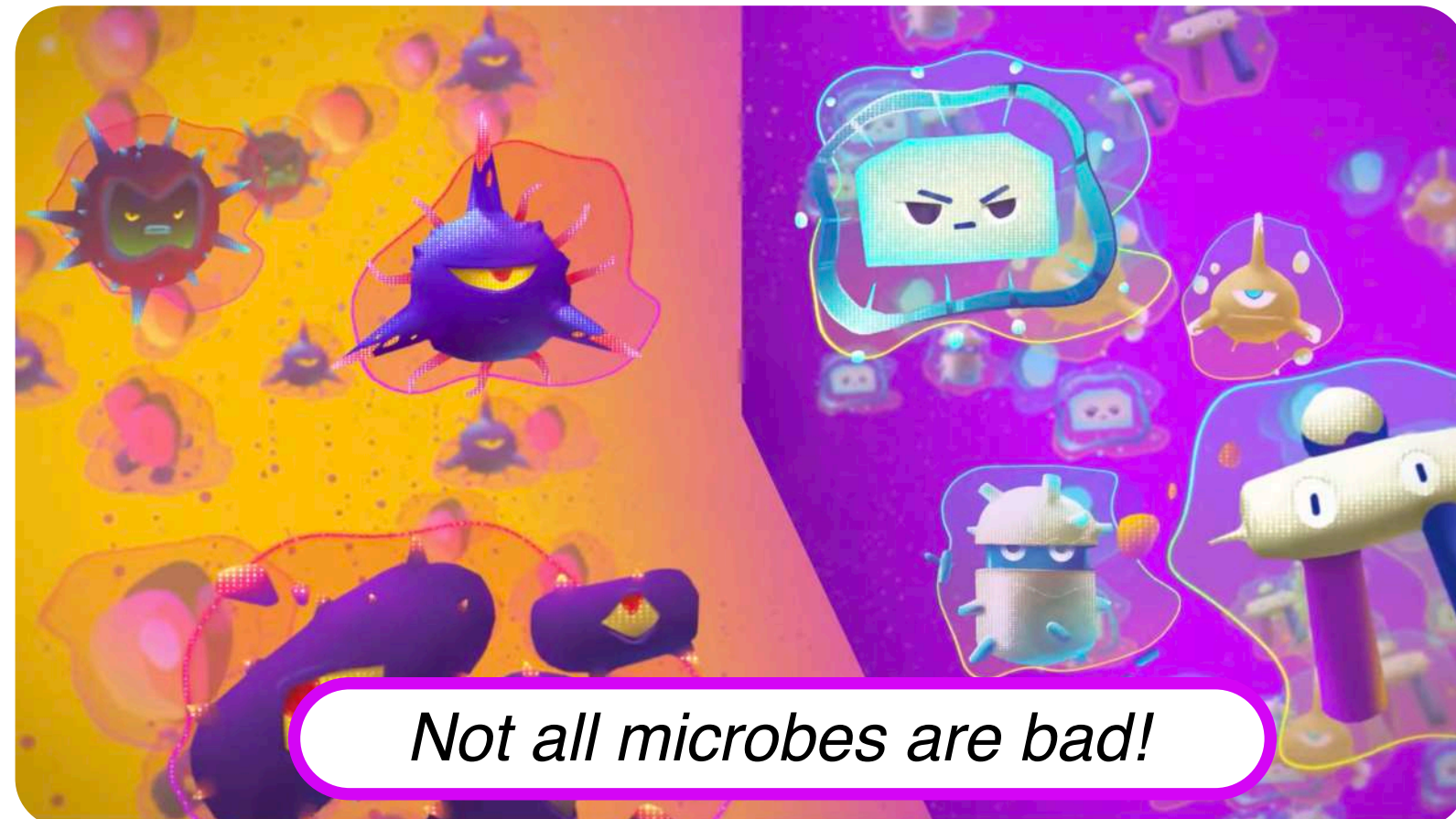
BORDERLANDS SCIENCE



Bringing together millions of players for human health!



Microbes live on skin, mouth, gut, etc.

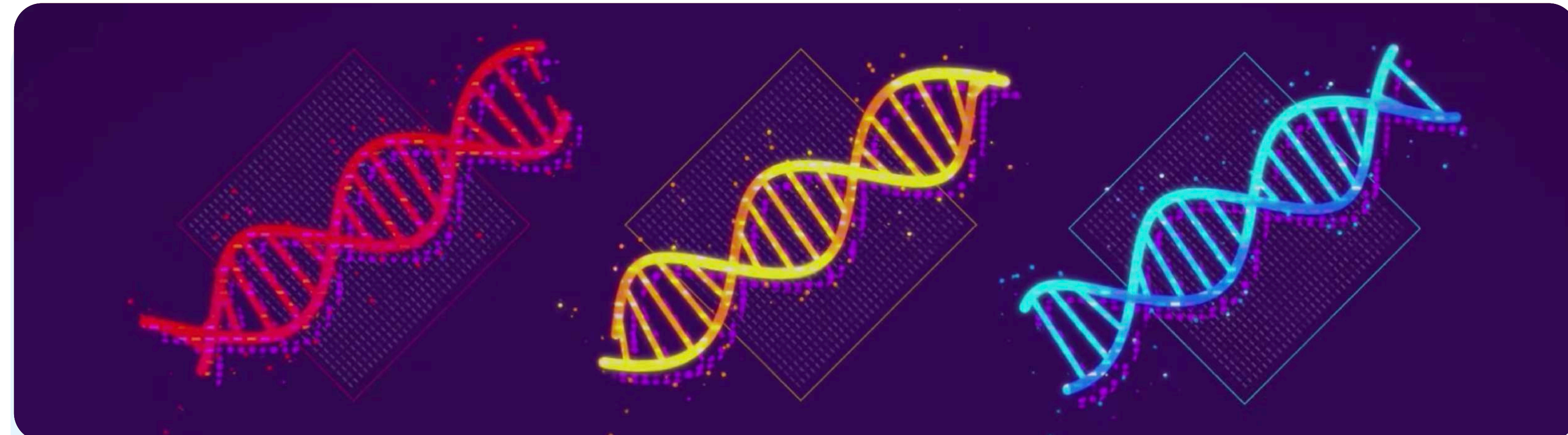


Not all microbes are bad!

A Did you know that microbes are our closest neighbors?

More than half the cells in our body are alien. They are microbes living on the skin, on the mouth, in the eyes...everywhere... and especially in the gut! You can picture your gut as a microscopic forest with microscopic trees, foxes, wolves, deer, etc

We most often hear of microbes such as bacteria and viruses as causes of illnesses. Indeed, many of them make humans sick, like the common cold or food poisoning. However, not all microbes are bad! The majority of bacteria you interact with are actually good for your health!



B The human microbiome is a maze!

We know very little about our millions of gut microbes. To understand how the microbiome carries its digestive functions, we would need to understand the function of each microbe.

Luckily for us, the biological function of bacteria tend to be heavily linked to its DNA, thus if we can identify two bacteria with similar DNA, we can hypothesize that they have a similar function.

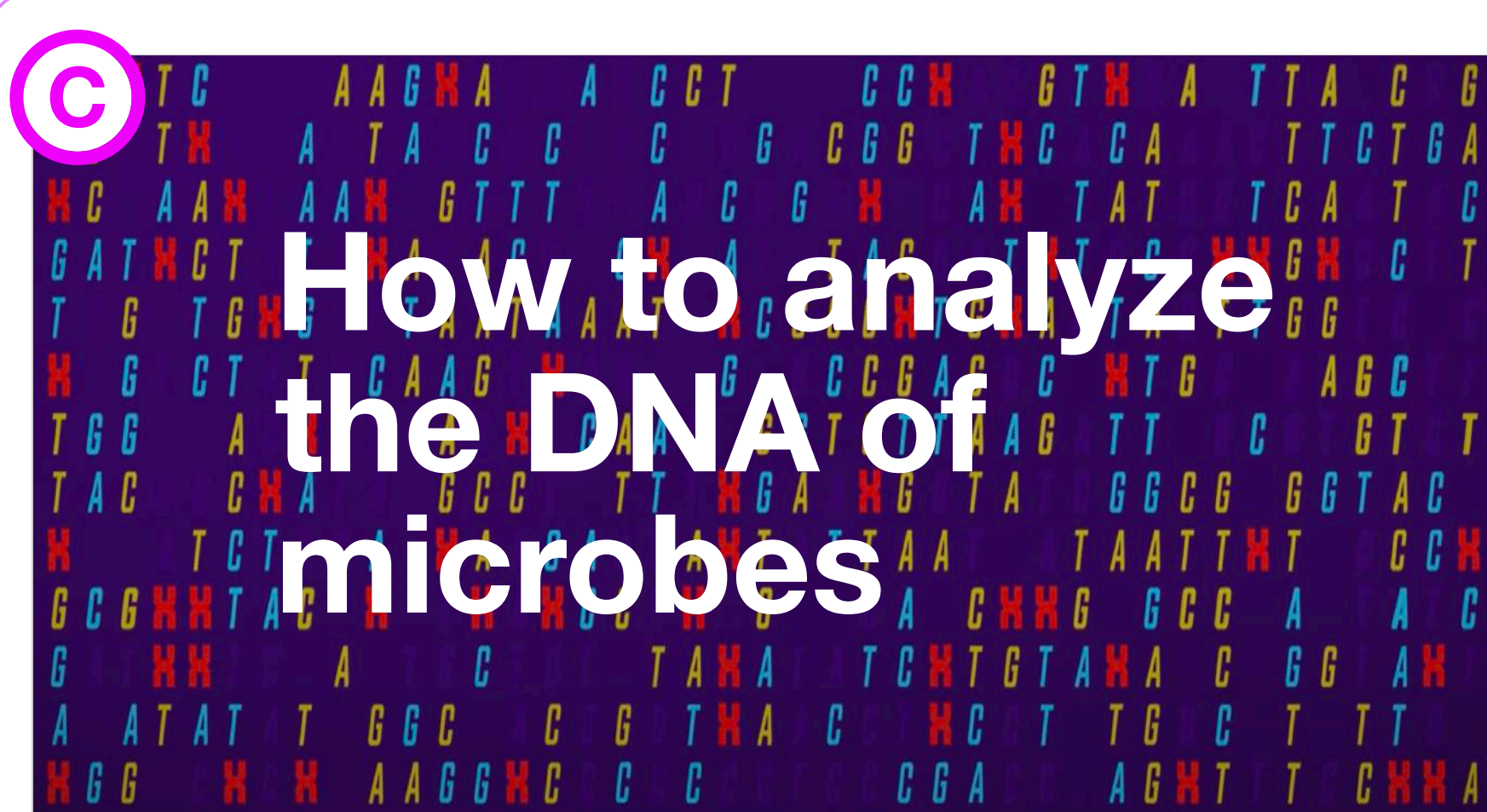
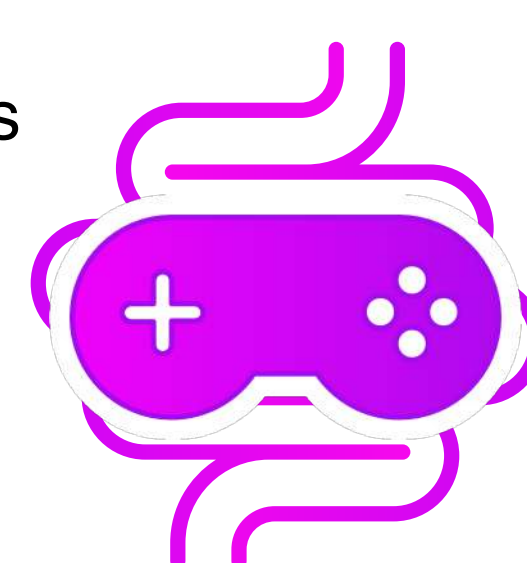
! Did you notice that some people are very good at digesting certain food (like fibers) and some are not?

It turns out our human body is not very good at digesting fibers or complex carbohydrates. Yet, most people can eat a lot of them and be just fine. Why? Because their gut bacteria digest it for them!

When we don't have the right gut microbes our digestive system can't work properly and we can develop health issues, like chronic inflammatory diseases, diabetes or obesity.

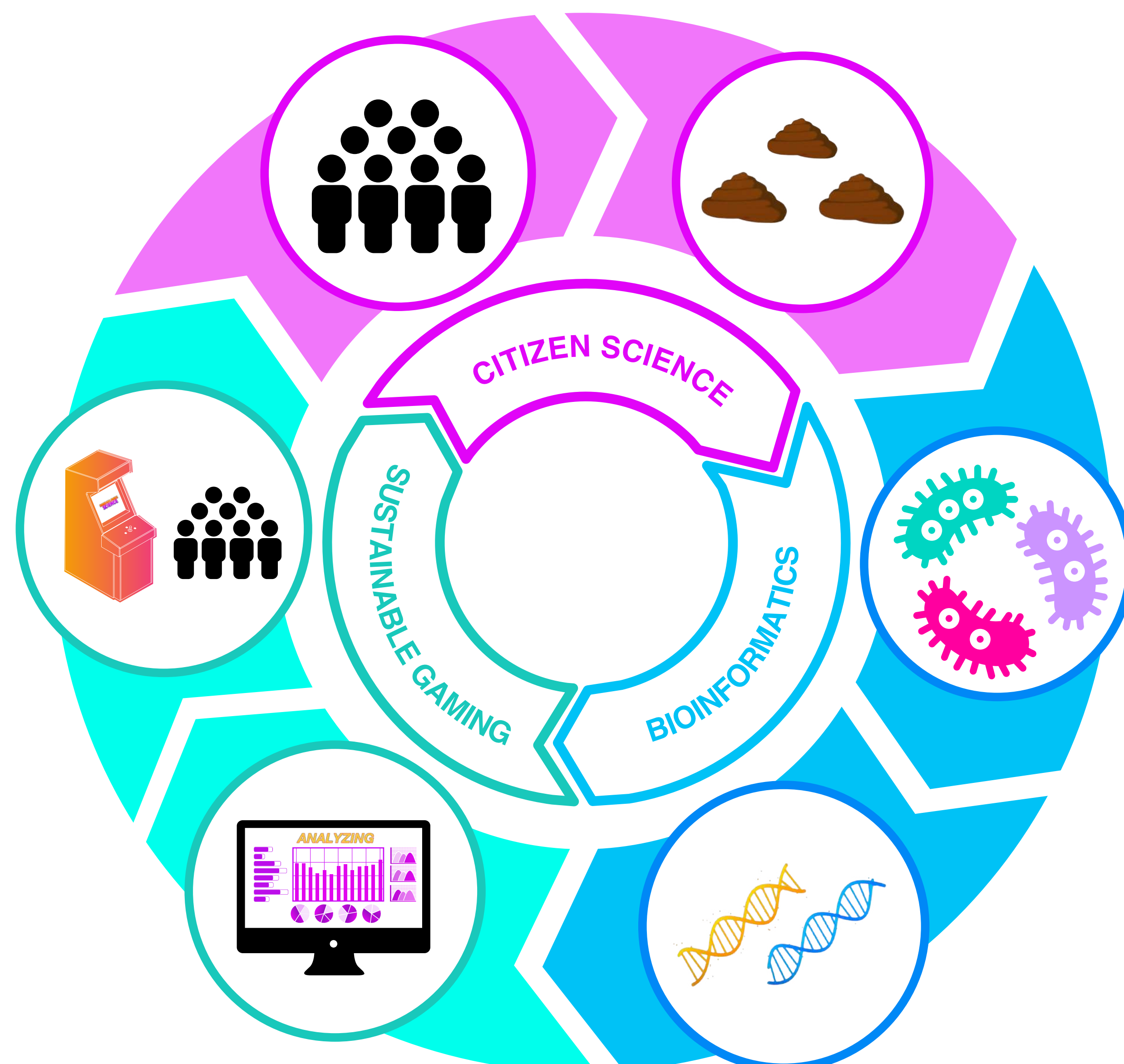
D From the gut to the game!

The Microsetta Initiative collects stool samples from thousands of participants, and extracts bacterial DNA from it. Next, the bacterial genomes are aligned using computational models. This is a difficult and error-prone process. Thankfully, humans can help correct these errors by playing Borderlands Science!



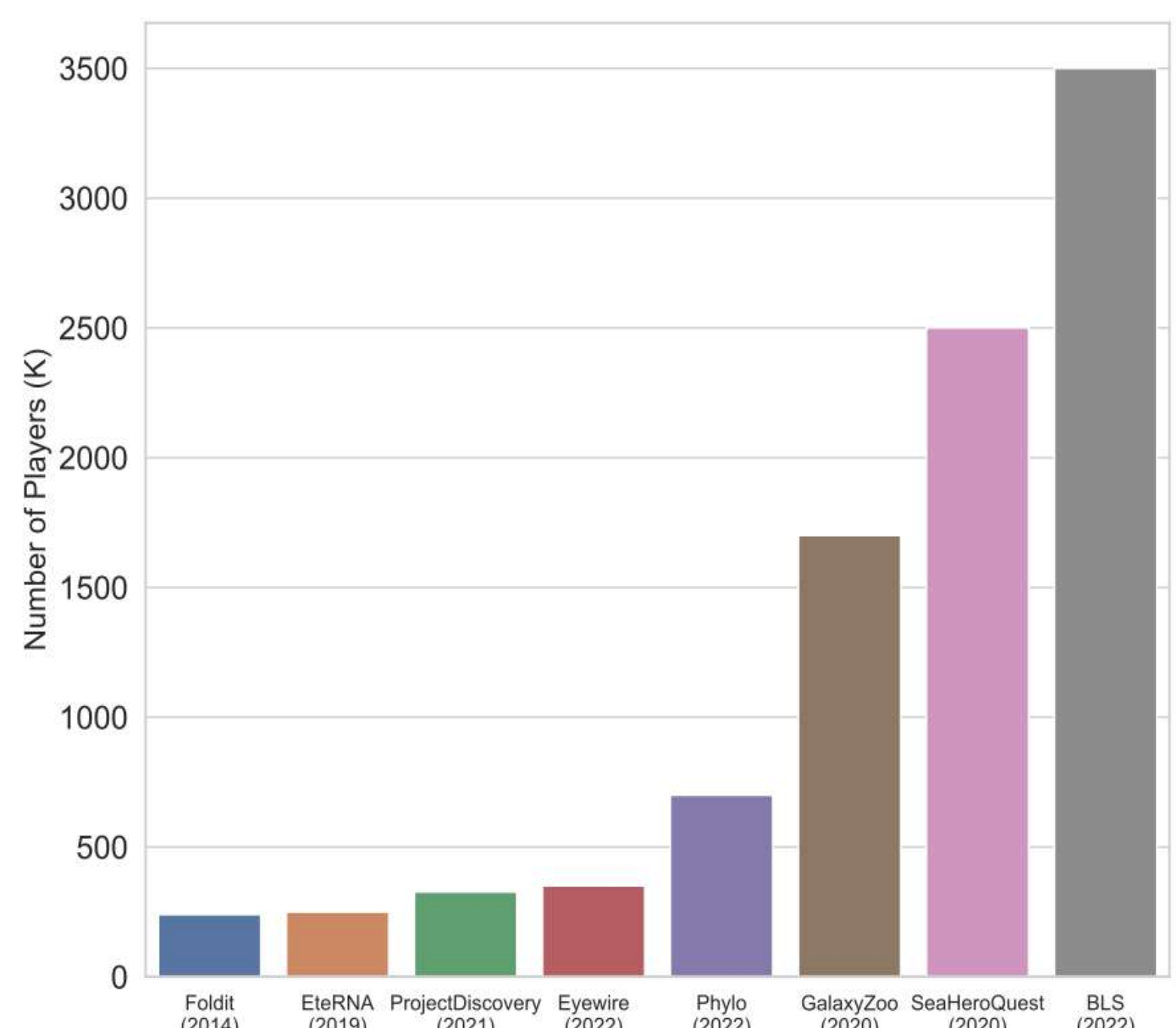
Computers can be used to solve the sequence alignment problem, but perform poorly on data we do not know very well, such as microbes. Humans' visual pattern recognition skills can help for this!

Borderlands Science is the game that harness human pattern recognition solutions for genome alignment of gut microbes.



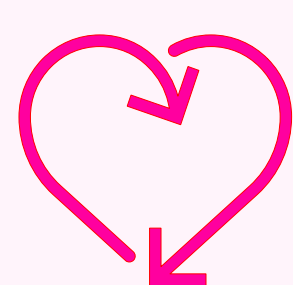
E A new citizen science paradigm

Borderlands Science is the first science discovery game embedded within a popular commercial game (Borderlands 3®). The pre-existing player-base unlocks new frontiers: with millions of players, problems that previously were unsolvable through citizen science now become viable targets!



Number of participants in some of the most popular citizen science games

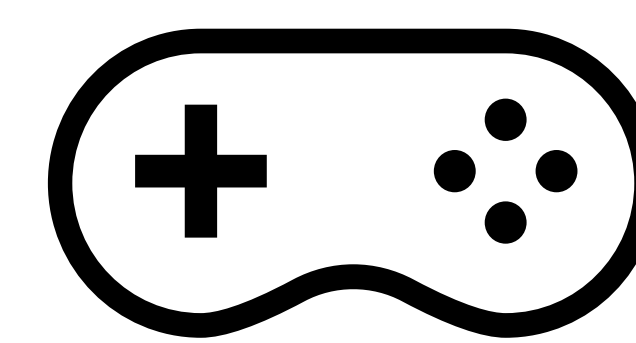
F Sustainable Gaming



Just like we collectively try to save water or reduce plastic waste, we can design games to contribute to the common good, when at the same time they are entertaining us. Borderlands Science shows that the most popular commercial games can engage gamers into scientific research and fight disinformation.

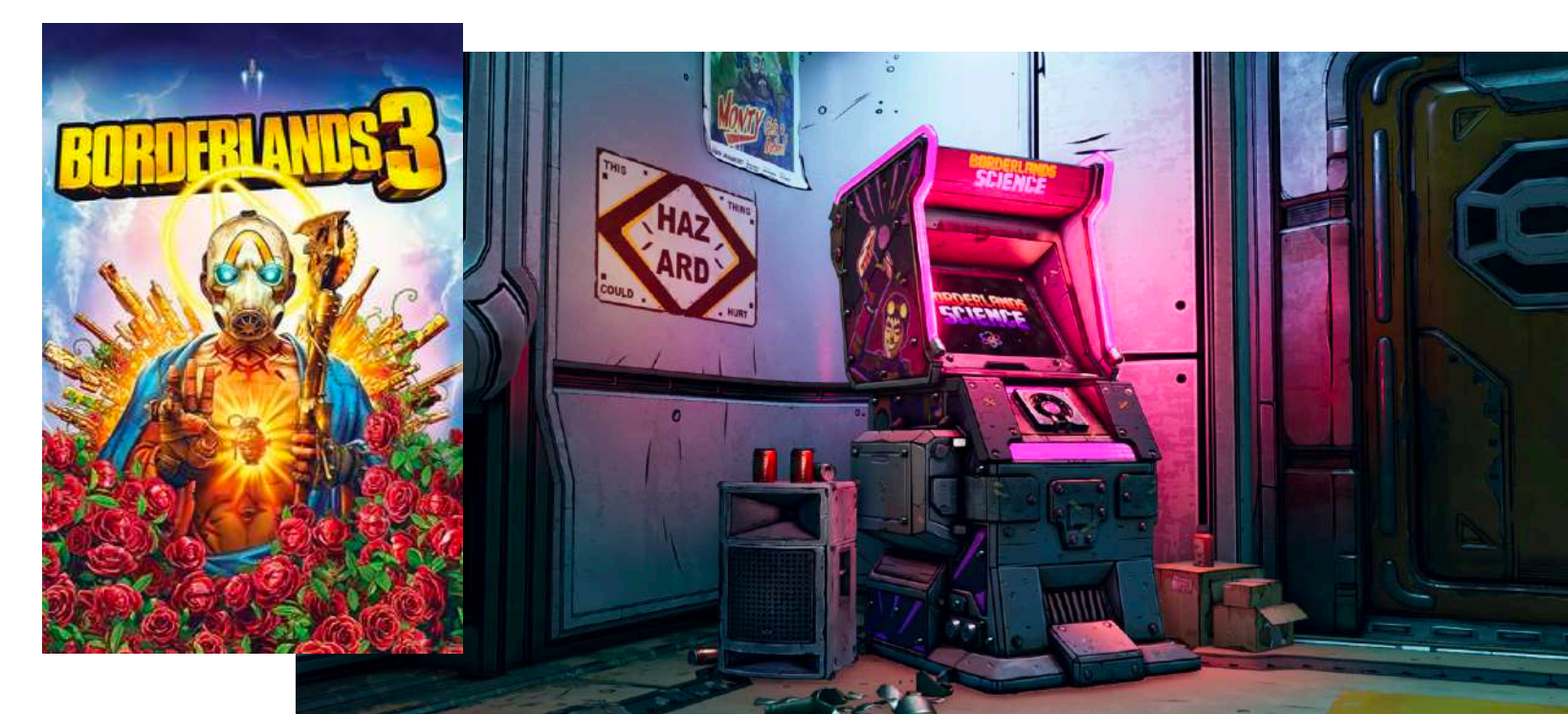
In 3 years, over 3 million players have submitted over 120 million solutions to more than a million puzzles. This amounts to more than 700 work-years!

BORDERLANDS SCIENCE



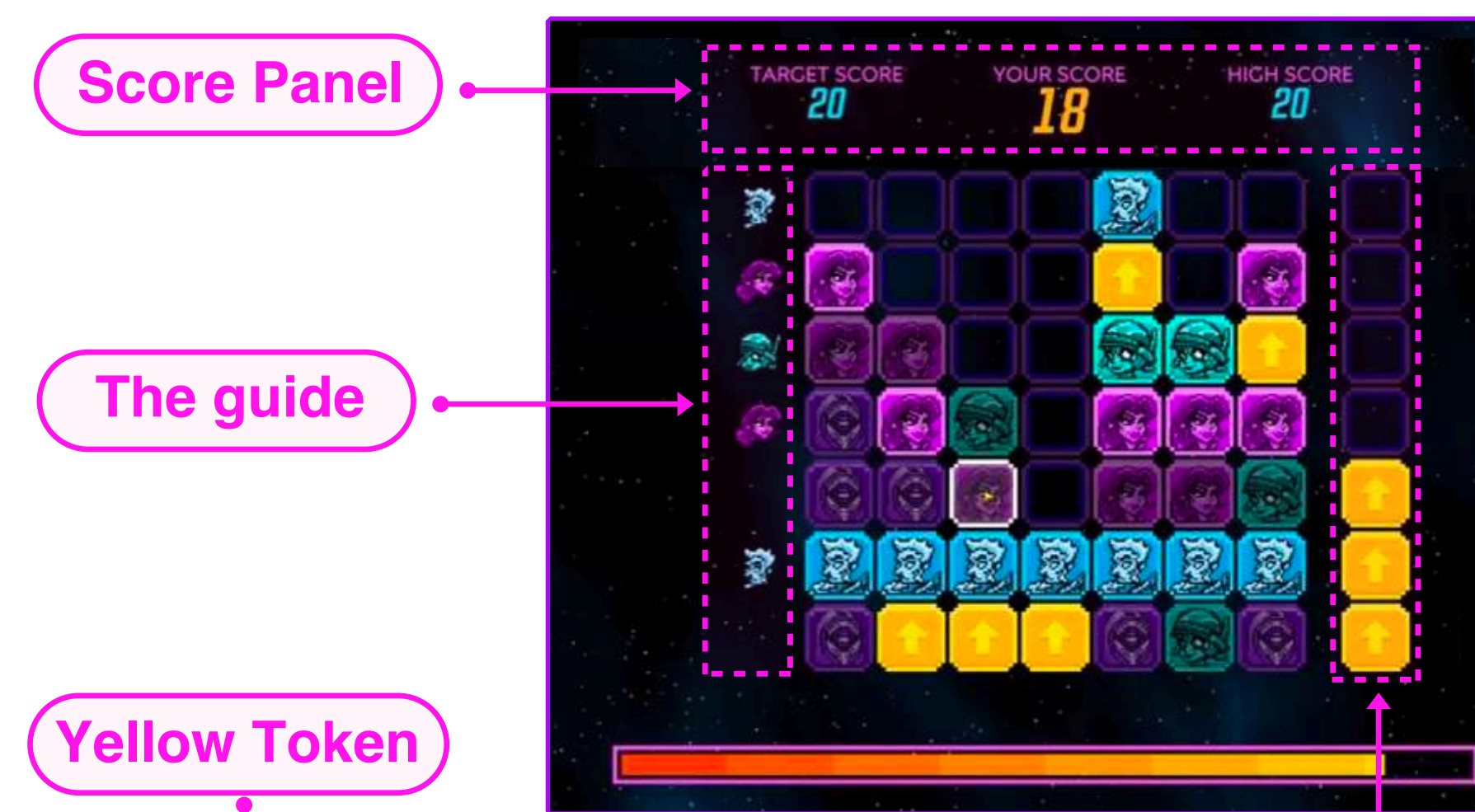
Borderlands Science

Released in April 2020, Borderlands Science is a mini-game within Borderlands 3 in which players solve puzzles in a virtual arcade booth located within the game's universe. Isn't this fun?!



By aligning the colored blocks in the game and trying to get the highest score, players are actually aligning gut microbe DNA and helping to identify their functions!

How to play?



Score Panel

The guide

Yellow Token

Task

Match colored blocks with the guide to score points.

Objective

Beat the target score!

Method

Insert yellow tokens below the colored blocks to adjust the height of the blocks. Be careful, you only have a limited number of tokens!

