Me as a microbe!

Previous compulsory steps / Prior students' knowledge	Cell Theory, Cell structure, Organelles, Mitochondria, Eukaryotic cell, ATP, Multicellularity, Aerobic respiration, Anaerobic function
Learning objectives	Familiarizing students with: • Biology of cells in relation to their environment, • Micro-organisms, • Organelles and their functions, • Chemoplasts, • Chloroplasts, • Chemolithoautotrophy, • Flagellum Exploring compounds and energy transformation in organisms
Subjects	Biology, Microorganisms, Evolution Theory
Recommended Age	15-18
Material needed	PCs that can run the game "Thrive"
Sequence duration	135 minutes
Individual or group activity	Classroom Group and Homework activities
Skills developed	Creativity, problem solving, collaboration
Price range of the game	Free or 3.99€ from STEAM
Similar games to use with the approach of the sequence	microcosmum

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Tips for inclusion	In “Options/Inputs” menu there are a lot of settings (to change/adjust) to help people with various disabilities
Tips for shortening the duration of the sequence	Step 3 can be performed at home.

Step by step: how to implement the sequence

In this pedagogical sequence, students are going to use “Thrive” and they are going to take the role of a microbiome (a micro-organism).

With this game, students will navigate the microcosm of microorganisms, create different cells and "watch" their lives in different habitats. They will look at how they take up and convert energy and approach the need for changes in order for these microorganisms to adapt and live in new environments with different characteristics (various gases, temperature, components, enemies, etc.).

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- **Step 1: The educator reviews biology concepts and discusses the basic concepts in Cell's Biology (35 minutes)**

Educator reviews some biology concepts with the students and uses a snapshot of the game info/help and the game itself in order to connect the game with these biology concepts:

- Cell Theory
- Cells
- Cell structure,
- Organelles,
- Mitochondria,
- Eukaryotic cell,
- ATP
- Aerobic function,
- Anaerobic function

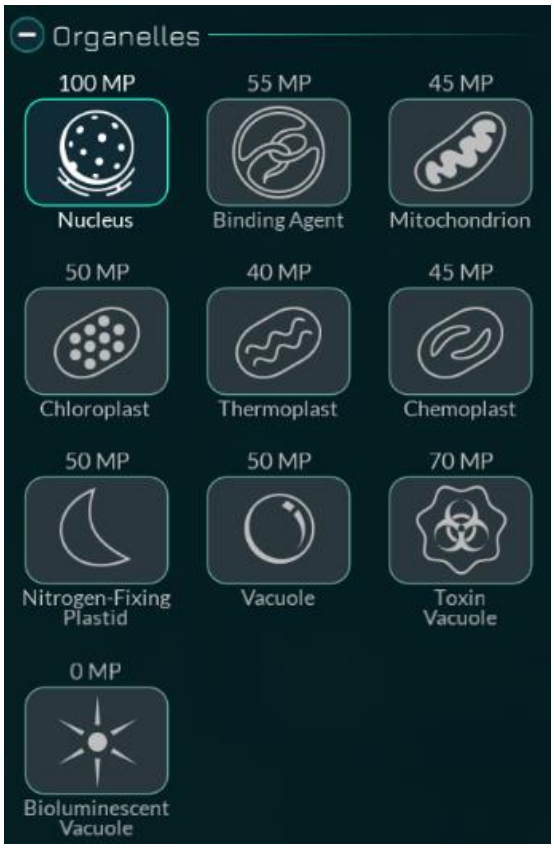

Figure 1. Organelles ("Thrive"**,** Revolutionary Games, 2021)

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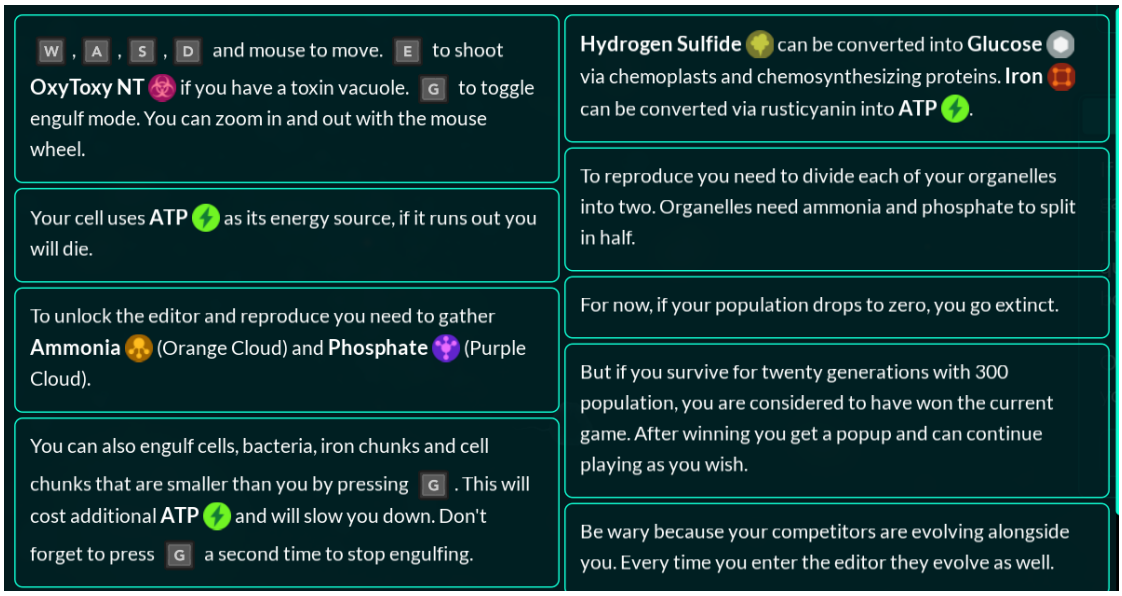

Figure 2. Snapshot of in-game help (“Thrive", Revolutionary Games, 2021)

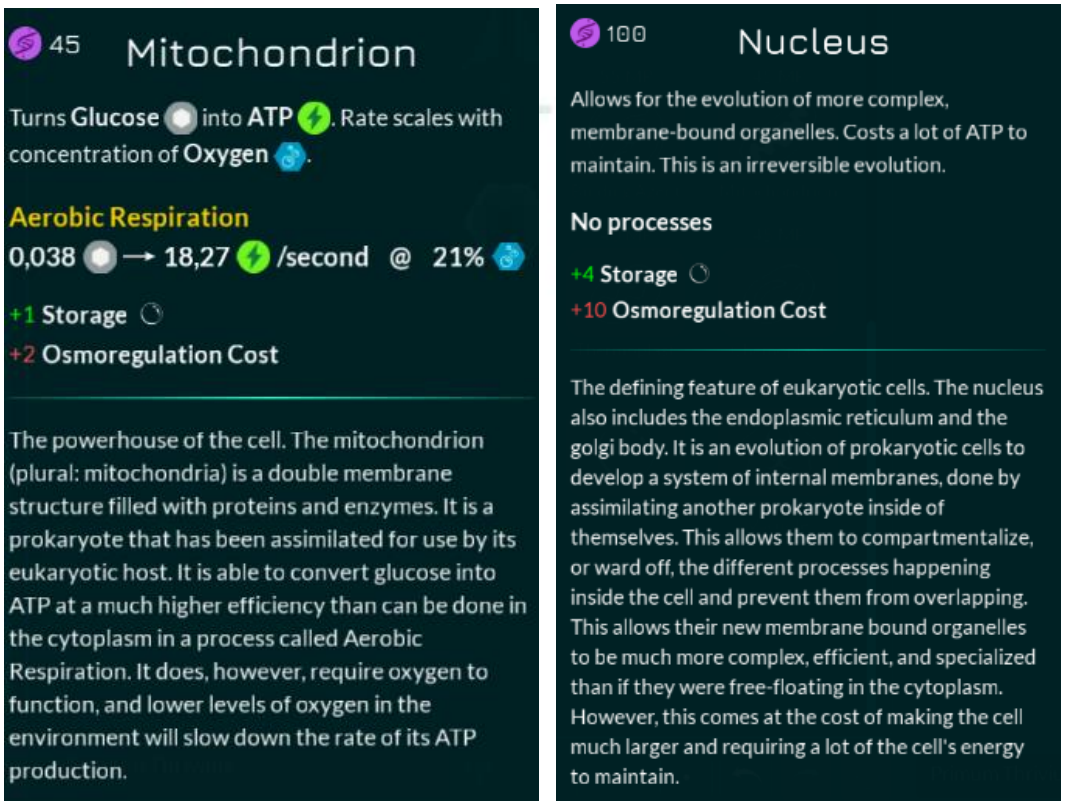

Figure 3. Snapshot of in-game info cards about Mitochondrion and Nucleus (“Thrive", Revolutionary Games, 2021)

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- **Step 2: Educator explains the gameplay of the game to the students (10 minutes)**

The educator uses the game and its tutorials to help explain the gameplay of the game to students.

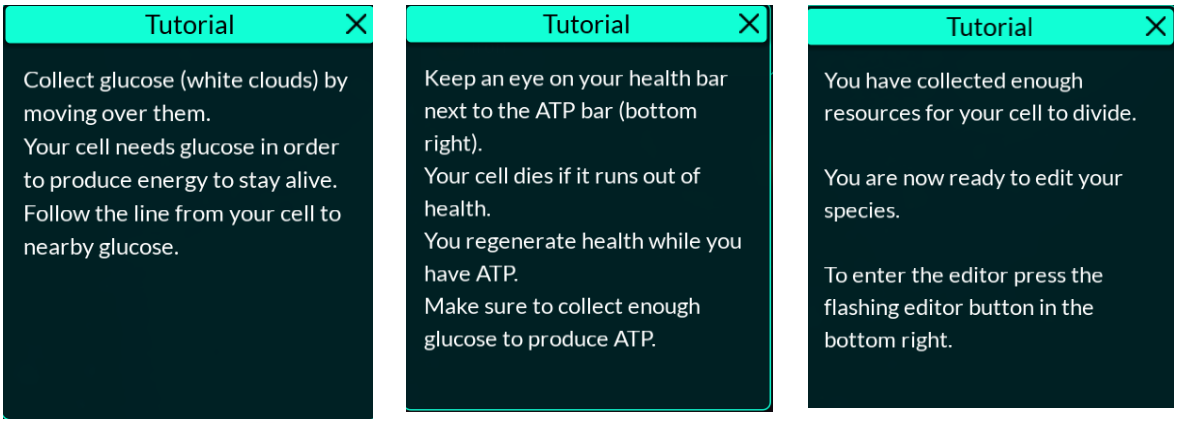

Figure 4. Snapshots of in-game tutorial tips (“Thrive", Revolutionary Games, 2021)

During the game, the screen has information windows for the environment, the components the micro-organism absorbs, the number of individuals in the species' population, and the energy the organism has.

Figure 5. Snapshot of the first screen of the game (“Thrive", Revolutionary Games, 2021)

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- **Step 3: Students discover the game by playing it (45 minutes)**

Students may start to play the game, choosing the “Pangonian Vents” patch from the 11 environments/habitats given. They start the game as a single cell and try to gather the appropriate compounds in order to live in the patch/habitat they had selected.

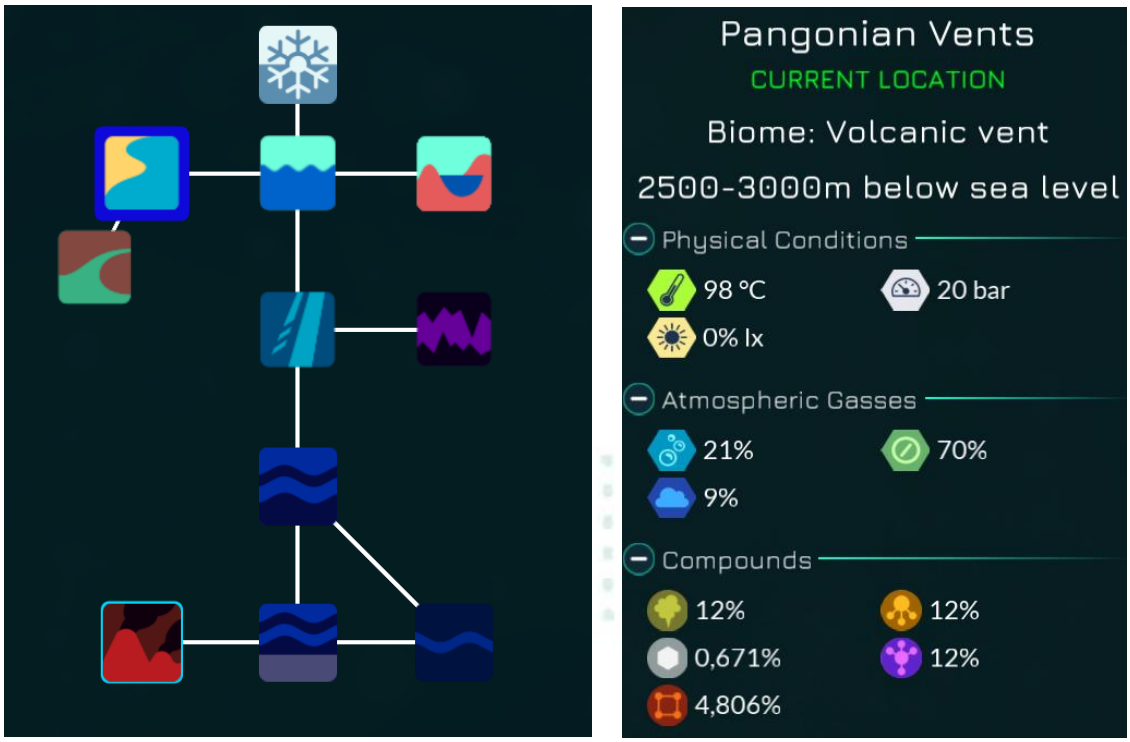

Figure 6. Snapshots of Patch selection screen - Pangonian Vents selected (“Thrive"**,** Revolutionary Games, 2021)

Students will use the game’s info cards to gain information, and for every new concept or function they meet, they will try to understand its function and mechanism. They can discuss any difficulties they encounter with the educator.

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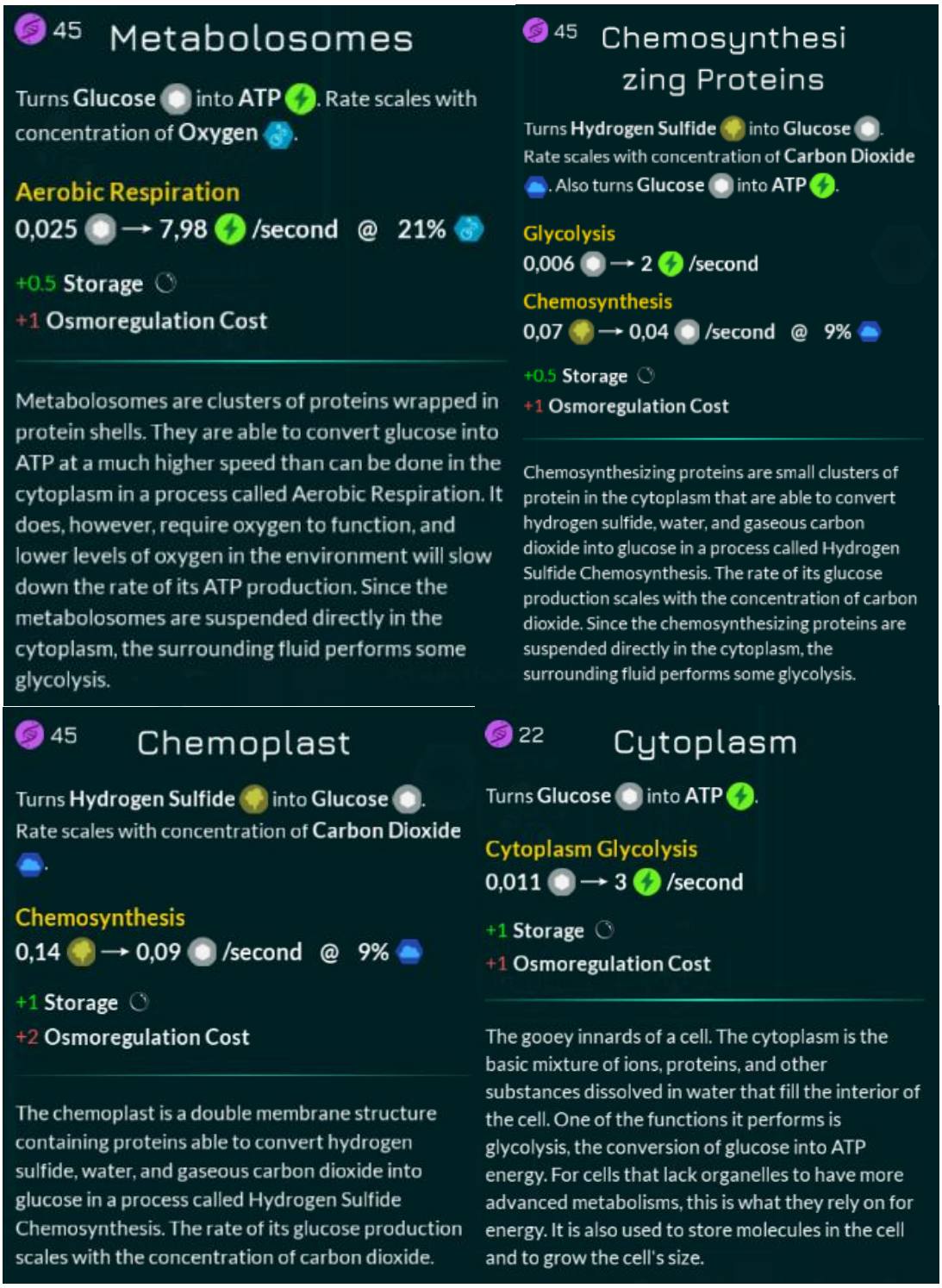

Figure 7. Snapshots of in-game help (“Thrive", Revolutionary Games, 2021)

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- **Step 4: The educator sums up (35 minutes)**

The educator sums up the following basic biology concepts that students encountered during the game:

- Biology of cells in relation to their environment,
- Micro-organisms,
- Organelles and their functions,
- Chemoplasts,
- Chloroplasts,
- Chemolithoautotrophy,
- Flagellum
- Compounds and energy transformation in organisms
- Metabolosomes

Then they may conduct a discussion with the students about the alternative options they could have chosen in order for the microorganism to Thrive!!!

- **Step 5: The educator proposes homework (10 minutes)**

At home, students may proceed to change the habitat, or they may use the same habitat but make other choices for the microorganism itself in order to explore additional concepts.

Note: Some options of the game are not implemented yet. It will be a complete tool for further use in the future.

Getting the game:
https://store.steampowered.com/app/1779200/Thrive/
https://github.com/Revolutionary-Games/Thrive-Launcher/releases/tag/v1.2.9

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References

Microbe stage. (2020). Thrive Developer Wiki. Retrieved December 16, 2021, from https://wiki.revolutionarygamesstudio.com/wiki/Microbe_Stage

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