# Teacher's Manual

**Authors:** Cibele C. Berto and Maria Lígia Coutinho Carvalhal
**Graphic Project:** Matias Larco
**Microbes' Original Drawings:** Cibele C. Berto
**Illustrations**: Jorge Oyakawa, Mayra Frediani and Matias Larco
**Scientific Revision:** Virus – Maria Lucia Racz
Protozoan – Anette Foronda
Fungi – Benedito Corrêa
Bacteria – Marina B. Martinez
**Translation**: Pedro H. M. Cabral
**General Supervision and Coordination:** M. Ligia C. Carvalhal, Project MicroTodos, microbiology on duty for society.
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## Letter from the Author

My concern about education in microbiology was elicited by several facts I have observed along the years, as a professor, researcher, mother, homemaker, and last but not least, a Brazilian citizen.

I started my career as a professor in the Biochemistry Department of the Chemistry Institute of the University of São Paulo, teaching microbiology and immunology. In 1985, I began teaching and coordinating microbiology courses offered by the Microbiology Department of the Biomedical Sciences Department of the University of São Paulo. For 28 years, as a professor or as a coordinator of undergraduate courses, I have had the opportunity to get to know students of several courses of the University of São Paulo such as students from medical school, dentistry school, biology, nutrition, pharmacy and biochemistry, occupational therapy school, veterinary school, etc. Together with professors from other departments, I have worked with the goal of creating favorable conditions to have microbiology regarded not as just another discipline in the school's curriculum, but as a fundamental knowledge for the competent practice of professional abilities.

As a researcher, my attention was always focused on the knowledge of microorganism physiology, the contribution to develop microorganism preservation methods and to use them to obtain beneficial products for the maintenance of the health of living beings and the environment.

As a mother, I have put my heart to protect and educate my son and all the people I have met in and out of school, since kindergarten until high school. Under this scope, I have always emphasized the necessity of developing our knowledge of the microbial world to assure a harmonic cohabitation with these beings that aren't visible to the naked eye, but are always present in our daily chores. To this harmonic cohabitation, I include the competence to defend ourselves properly against diseases that the microbes may causes, as well as the ability to maintain, with human actions, the existing balance between living beings and the environment.

As a homeowner, I was always attentive to domestic habits, such as the way food is washed and preserved, properly cleaning the bathrooms, the best way to dispose domestic waste and especially the habit of washing hands properly.

As a Brazilian citizen and microbiologist, I have not missed the opportunity to express my opinion in situations we experience or witness. I can list some that I still have in my memory: Inside a drugstore, a woman with an insect-stung eye was instructed by the sales clerk to purchase an antibiotic that not only would not help the healing process, but would expose the person to side effects as well as contribute to the emergence of resistant microorganisms. ; In a dental office I found

that the working instruments were oven sterilized at 90°C for five minutes, when we know that the minimum time required to ensure the elimination of some viruses and bacteria is often longer than what was being applied. So many other examples could be cited.

In this trajectory, I had the opportunity to understand and evaluate what was, in our country, the understanding of microbiology away from the University environment. At that time, as coordinator of the area of microbiology education by the Brazilian Society of Microbiology, I considered it urgent to develop and adopt an educational policy in Microbiology for elementary, secondary and higher education. A policy with bases intimately anchored in the daily actions that determine the relationships of individuals with microscopic beings.

I believe in the responsibility of researchers and teachers in leading the direction of microbiology education in Brazil. Only the awareness that comes from meaningful learning will change the behavior of individuals in their relationships with the environment in which they live so as not to destroy it but to preserve it or turn it towards sustainable development.

Perhaps one question remains, among many:

- Why a game?

I will respond as a retired adult teacher, rescuing the child I still have in me:

- When we play we risk, investigate, make mistakes, criticize, evaluate, discover, relate, share, think, compete, repeat, grow and ... above all ... have fun and have pleasure!

I ask:

- Why not in the classroom?

**Maria Lígia Coutinho Carvalhal**

## Abstract

**MicroVillains in Action is a game focused on the health issues of individuals.** The game has the following contents: microbial agents that cause diseases and aspects related to their transmission and prevention of many diseases that can affect people or even entire populations. The presented pathogenic microorganisms were selected according to their importance in the context of brazilian public health.

It is a game of quartets (see rules) made up of cards that relate the disease with its causative agent, its transmission and prevention. The game is presented in 3 different modalities aimed at different age groups from 7 years (literate people). "Action" and "villain" games are recommended for elementary and high school children although once literate the student is able to play. The age range of the students can determine the diseases chosen to be worked on. The game "each disease with its agent" has a more childlike character and does not require the same agility and speed of reading and association. This way is recommended for younger children, as long as they are literate. The necessary materials for the game and its rules, as well as suggestions for classroom activities are available in the printable appendices.

In the text Microbiology in Focus, some fundamentals, news and curiosities about the science Microbiology are presented, according to the authors.

## The MicroVillains game as an instructional and pedagogical tool

MicroVillains in Action is a game aimed at introducing into the classroom the "universe" of pathogens, that is, microbes that can cause disease.

The act of playing has, in the educational process, an unique and indispensable place. Playing, the child discovers his possibilities as an individual, perceives himself in a social dynamic and knows his reactions to situations of losses and gains.

While playing, the student comes into contact with a set of rules that must be strictly followed. In adolescence, however, the rules of the game gain even greater importance, since the adolescent has a predisposition to question the values imposed on him by his family and society. By choosing the game as an instrument for the transmission of scientific information and educational notions, we intend to respond positively to the students' wishes. Playfully, students come into contact with disease-causing biological agents, know their names and understand their forms of transmission.

The game “Action” gains special value when it proposes in the 1st stage (with the big cards), a group dynamic in which each participant incorporates a character or situation played. The result is everyone's participation and the creation of a motivating climate for meaningful learning that can change students' behavior and habits in the face of issues related to their growth, sexuality and health.

As a pedagogical tool, the MICROVILLAINS game enables the teacher to work on concepts of hygiene, sanitation, pollution, vaccination, nosocomial infection, health, sexually transmitted diseases, defense mechanisms of the organism including the natural microbiota and also assists in the task of raising students' awareness. the exercise of citizenship in government vaccination campaigns, hygiene habits and epidemic prevention.

Knowing the ways to prevent diseases caused by microorganisms, students expand their possibilities of participation in family and society with practical attitudes that can contribute to an improvement in quality of life.

This handbook outlines the general rules of the different game modalities and proposes extra after-play activities that can be used and enriched by the teacher according to the reality of his classroom. The very choice of diseases and the degree of depth in which they will be worked on may follow regionality as a parameter, as some diseases are more common in certain regions of the country than in others

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## Central theme

Disease-causing microbial agents and aspects related to their transmission and prevention that can affect people or even entire populations.

## Area of interest

Microbiology. Public health. Transmission and Prevention of diseases caused by microorganisms in humans.

## Materials

- 84 large cards (used in the “Action” game)
- 84 small cards (used in the “Villain” and “Every disease with your agent!” Games)
- 1 small MicroVillain card (used in games with the small card)

## Example of a quartet

D (Disease)

A (Agent) Transmitter

T (Way of Transmission

P (Type of Prevention

**To form a quartet follow the guidance below:**

Identify the card in your possession by the letter located at the top right.

D (Disease)

A (Diseade agent)

T (Form of transmission)

P (Form of prevention)

The Letter located on the right side at the bottom identifies the card to be searched among the other players. The search should be done based on the reading of the text located at the bottom of the card and the respective image of the card to be found.

Check in the example of the quartet shown below.

Note - Card sets are the same, only the sizes are different. The MICO-villain card only exists in small size.

## Complementary material

Guide to the formation of quartets (see link on game page)

Suggested Post-Game Activities (page 13)

# THE GAMES

## THE "ACTION" GAME

**Big cards**

**Number of players** 8 to 84 players, always in multiple of 4.

The number of cards to use is equal to the number of players, for example, for a class of 36 students, play with 9 full quartets.

**Age range:** from 7 years. (literate)

For the teacher: If the student group is not a multiple of 4, you should create roles for everyone to participate in or assign a couple of students to the same role.

## Preparing the activity

Separate the number of quartets to be used according to the number of players. Use the quartet training guide.

## Start

- The players (students) are scattered around the room.
- Each player receives from the teacher or assistant a large card that must be affixed to the clothing or held in front of the body with the image facing the audience.

**The goal of each player is to find their partners to form with them a complete quartet (D, A, T and P).**

## Dynamic

Each player silently reads the hint of their card (text at the bottom). Next to the hint is the letter corresponding to what type of letter it refers to: D, A, T or P.

Players begin searching for the bearer of the image corresponding to their hint text. (See above an example of a quartet)

When four players meet the cardholders matching their hints and form a quartet, they come to the teacher to check the correctness of the formed quartet and receive instructions on the new activity to be developed.

## Ending

The 4 players with the quartet formed must arrange themselves around the room until all quartets have been completed. From this moment on, the teacher can develop various activities that help students to understand the concepts and, consequently, to memorize the information. (See Post-Game Activity Suggestions_pg 15)

## “VILLAIN” GAME

**Small cards**
**Number of players:** 3 to 21.
The number of players must match the number of quartets.
**Age range:** from 7 years (Literate). Elementary and high school.

## Preparing the activity

- After setting the number of quartets, they should be separated and shuffled (use quartet training guide)
- Provide a sheet of paper to write the names of the players and the cards they will receive during the game.
- Players must be distributed in a circle or close enough to facilitate the passage of cards from one player to another.

## Start

- Each player receives 4 cards face down.
- Players (individually) look at their cards and read their hints (text at the bottom of the card) silently to see which card to look for to form a complete quartet.

**The goal of each player is to form a complete and correct quartet in the hands (D, A, T and P).**

## Dynamic

- The game begins with each player passing at the same time a card (always face down) to the player on their right.

For the teacher: agree upon the time for the cards to pass from one player to another.

- Players go through the cards, trying to get rid of those that are hindering the formation of their quartet

- The player who makes a correct quartet must quietly lower his cards without the other players noticing.
- Whenever a player realizes that someone has lowered the cards, they should do it so silently, even if they have not formed the quartet.
- The last player to lower their cards receives the letter V (from villain). Whenever a player is the last to lower the cards he will add letters of the word villain, that is, if he has already received the letter V once, the next time he is the last one to lower the cards he will receive the letter I and so on.
- After the end of each round, that is, after all players have lowered their cards, the other players must observe the correctness of the formed quartet, observing the following possibilities:

  - THE QUARTET IS CORRECT
  - The last player to lower the cards gets a letter of the word “villain”

The cards are collected, shuffled again and the game continues by repeating the initial steps of the first round.

  - THE QUARTET IS INCORRECT

The player who mishandled the card receives two letters of the word "villain". The cards are collected, shuffled again, and the game continues, repeating the initial stages of a new round.

## Ending

It can occur in two ways:

a. After a predetermined period of time, the player who has obtained the smallest number of letters of the word "villain" wins.
b. When any player completes the word "villain" the game is over and at that moment the winner will be the player who has received the least letters of the word "villain"

## VILLAIN GAME with the JOKER-Villain card

The rules for playing with the JOKER-Villain card are the same as for the Villain game with the following modifications:

- The JOKER-Villain card is included in the deck along with the cards that make up the quartets.
- Cards are distributed the same way as in the villain game, but one of the players will receive five cards instead of four.
- The player who forms the correct quartet will not be able to lower his cards if he has the JOKER-Villain card, that is, he must first get rid of it by passing it to the right-hand player before he can lower it.

## "Every Disease With Your Agent" GAME

**Small (recommended) or large cards.**

**Number of players** 2 to 7 players.
**Age range:** from 7 years. (literate).

### Mode 1: Take from the mount

## Preparation

- Players should sit in a circle so that everyone has the same access to the center of the circle.
- From the complete deck, separate the "D" (Illness) and "A" (Agent) cards. Thus, for this game we will have a deck consisting of 42 cards, 21 D (sickness) cards and 21 A (agent) cards.
- Shuffle the cards.

## Start

- One player in possession of the deck distribute 3 cards to each player face down.
- Players (individually) look at their cards and read the "D" card tip to know the agent of that disease. Only the D cards has the tip for the A card.
- After dealing, the remaining cards should be in a mound in the middle of the circle with the images face down.

**The goal of each player is to form and lower in front of him the largest number of pair of "D" cards and respective "A" card.**

## Dynamic

- Raffle the player who starts the game.
- Each player examines in their cards the pairs they can form and lowers them in front of them.

ATTENTION! Whenever a pair is discarded the player must draw from the pile the same number of cards, there is, 2 cards for each pair down.

- The first player must always draw a card from the pile. Then you should "discard" in the center of the circle a card (face up) that does not fit you in forming a pair. Thus, at the end of a round all players must always have the same number of cards.
- With the exception of the first player, to obtain cards to pair the player may in their turn choose the last card that was discarded by the previous player or remove one card from the pile (always the top one). Attention! The card that was discarded by the previous player can only be collected by an out-of-turn player if it completes a pair which must be immediately lowered in front of the player. When this happens, the game proceeds in the previous order, that is, the player plays again.
- When all cards on the mound are over, the discard cards are shuffled into a new mound.
- The game continues with each player buying one card in turn and discarding another card.

## Ending

The game ends until the cards are over and there are no more discard cards to replace.

The winning player is the one with the highest number of pares in the end.

## Mode 2: Take from another person (insert JOKER-villain card)

### Preparation

- Players should be seated in a circle to facilitate contact for the withdrawal of each other's cards.
- From the complete deck, separate the “D” (Illness) and “A” (Agent) cards. Add the JOKER-villain card. Thus, for this game we will have a deck consisting of 43 cards.
- The number of pairs that make up the deck must always be at least 3 times the number of players. So if I have 4 players, the number of pairs in the deck should be at least twelve pairs plus the JOKER card, 25 cards.

### Start

- One player deals all cards between the players face down.
- Players (individually) look at their cards and read the "D" card tip to know the agent that will form a pair with this card.

**Each player's goal is to pair up, finish discarding all cards and get rid of the JOKER-Villain card. The player who gets the JOKER-Villain card loses the game after all other players have got rid of all the cards, discarding pairs.**

### Dynamic

- Raffle the player who starts the game.
- Each player examines in their cards the pairs they can form and lowers them in front of them.
- The first player starts by drawing a card between the cards from the hand of the player to his right. If this card forms a pair with any card in your hand, discard the pair formed in front of you. He then offers his cards to the next player so that he can also draw a card without seeing what he is drawing. Each time a player is dealt a new card, he tries to pair up and if he does not form a pair, he deals his cards to the next player on the right.

- The game continues this way following the sequence of the players in a circle. When a player eliminates all cards from his hand the game continues between players who still have cards in hand.

## Ending

When all players have finished the cards in hand, the one with the JOKER-Villain card loses the game!

## Post-Game Activity Suggestions

### THE "ACTION" GAME

Students, having understood the relationship of the quartets (Disease, Agent, Transmission and Prevention), can develop various activities to work and fix the contents. We propose some that can be enriched and expanded by the teacher, taking into account the context of each classroom.

1. In possession of the quartets formed during the game, propose to the students based on the information transmitted by the texts and images of the cards:

- writing a comic on the theme of the quartet
- a song or poem that talks about preventing the disease in question
- a poem on the topic
- a slogan for a campaign to prevent the disease.

2. Creation and dramatization of texts, using the characters of the cards (agents) or creating new characters (exploring narrative elements, with a defined time, setting and environment);

3. Construction of a table in which will be released the data recognized during the formation and discussion of the quartets. The table can be arranged on the blackboard itself so that each group lists the form of prevention and transmission in the table and then there can be a comparison between these parameters when dealing with diseases transmitted by bacteria, viruses, fungi and protozoa.

4. Preparation of a comparative table between the data provided by the game and the vaccines registered in each player's vaccination card (for this activity, each student must bring a copy of their vaccination card);

5. Organization of debate based on the concepts studied in the quartets, expanding to others such as: immunity, hygiene habits, self-medication, outdoor living, sleeping and eating well, playing sports, smoking, drinking alcohol, using drugs, etc.

6. Organizing an interview with a pediatrician or health care professional about:

- care to be taken to prevent a particular disease
- level of disease incidence in the interviewee's office
- most vulnerable age range, etc.

7. Organization of an interview with a geriatrician about:

- most common diseases in elderly patients
- care to be taken to prevent them
- eating and lifestyle and healthy attitudes in old age
- vaccines for the elderly.

8. Research on the incidence of certain diseases during the months of the year in your state. At the end, the teacher can guide the construction of an annual schedule of these diseases and post it on the class or school board. The research may also cover other regions of the country, which may result in a map of Brazilian diseases. With this data represented, students will be able to make links between the economic situation of these populations, the number of diseases and the number of people who become infected and how many die. This will be an appropriate time to talk about citizenship, public policies and social responsibility;

9. Making informative leaflets about the contents of the quartets. Distribute them to the community with the goal of guiding the public about prevention, agents, hygiene, habits, etc. This activity may be integrated with other areas; in this way, the English teacher will be able to guide the group in the correct language for an informative text, the arts teacher will help in the informative illustration and the product may be finished in the computer lab.

10. Interviews with parents, grandparents and older people to find out how contagious diseases were treated in the past, what epidemics they saw, what treatments were recommended, etc. With this data, the teacher will be able to establish differences and similarities with the current procedures, elaborating at the end, a collective text about the theme;

11. With the various student productions, the teacher will be able to eventually lead a major campaign on healthy attitudes towards school staff and parents.

# HAVE A GOOD TIME!!