# FREQUENCY OF THE STRAINS OF STAPHYLOCOCCI RELATED TO THE MANNITOL FERMENTATION AND THE FREQUENCY OF THE STAPHYLOCOCUS AUREUS PIGMENT TYPES

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REVIEW, RESEARCH ARTICLE

**Abstract**
*Staphylococcus aureus is one of main colonizers of the human body. In some situations the colonizing strain can become pathogen agent, producing localized or systemic infections; rarely the staphylococci infections appear immediately after an exogenous contamination. The colonizing with MRSA can persist for periods of months and even years, until the moment when it determines an infection; the colonized persons can contaminate other persons, these being the most important collector of MRSA. The staphylococci infections can have a non-favorable evolution due to an increased aggression of the bacterial strain, of a reduced capacity of anti-infectious defense of the patient or due to the difficulty to treat an infected patient with a strain (multi)resistant to antibiotics.*

**Keywords**: colonization, infection, contamination, strains
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## INTRODUCTION

The bacteria are micro bodies with a wide spread in the nature, as a result of their adapting during the process of evolution. The natural collector of bacteria is the soil where the concentration of cells can reach to values of 107-109 g-1 in the superficial layers (aerobe bacteria) and in the depth layers (anaerobe bacteria). From the soil the bacteria has adapted to live in the waters, where the concentration of cells can be from 10 x cm -3 in spring water, up to values of 1012 x cm -3, for example, in the fecal-household waters. The bacteria can be met in larger depths in the water of sea and ocean, in thermal waters.

The existence in the air of the bacteria is temporary and through the air currents they are spread on very large distances. From the air they are attracted again in the soil through the atmospheric precipitations.

The bacteria are part of the natural microbiota of the plants and animals. From the soil, through the growth of plants, the bacteria reach to their surface and are maintained in active status until the favorable conditions allow them to grow and reproduce. In the animal body there is an intestinal bacterial microbiota with important role in the transformation of the food bowl and in the immunity of the body; in herbivore animals, the anaerobe bacteria from rumen contribute to the degradation of the cellulosic fibers in the process of nutrition. From the animal body the bacteria are eliminated in the environment through the excrements.

In natural conditions, the bacteria have a huge role in the transformation of macromolecular compounds in simple compounds, by the mineralization of the dead organic matter, thus contributing to the natural accomplishing of the circuit of elements of vital importance: carbon, azote, sulphur, phosphorus, iron and others. Due to the activity of micro-bodies from the soil is created the reserve of nutritional substances – the humus, necessary for the development of the plants. In truth we can say that, without the activity of the bacteria, "the earth would transform step by step in a huge graveyard". In the food industry the selected lactic bacteria are used as starter cultures in the manufacture of acid lactic products and cheese, in the bakery industry, in the preservation of the vegetables, olives, green fodder.

The propionic bacteria are used for the manufacture of Swiss cheese because by

fermentation they produce propionic acid and CO2, responsible for the characteristic of these products.

The acetic bacteria are used for the industrial obtaining of steel. In biotechnological ways, using selected bacterial cultures or their mutants, are obtained products with a large economic value, for example: enzymes, proteins, amino acids, lactic acid, acetic acid, solvents (acetone, dimethyl carbionol, propyl carbinol), hormones (the insulin produced by a mutant of *Escherichia coli),* biologic fertilizers (*Azotobacter),* biologic insecticides *(Bacillus thuringiensis),* antibiotics *(Streptomyces sp.),* vitamins *(Propionibacterium shermanii* - vitamin B12).

## MATERIAL AND METHODS

For the performing of the study we used also the archive, registered in the specific program of the computer from the laboratory of S.C. Diaser, Oradea, in the computerized data base of the unit, respectively.

**Necessary materials for the performing of the examination:**

- A recipient of collection (collection recipient with collecting spoon) with transport medium
- Wooden spatula
- Latex gloves

For the collection of fecal matter it has to be collected a sample of fecal matter of 5-10g introduced in the collection recipient of fecal matter with transport medium. If the stool is liquid, it will be collected 5 ml. It is recommended to be chosen a liquid, mucous and bloody portion, if there is one. Don't collect quantities larger than 10g because it will reduce the chances of isolating the pathogen bacteria.

## RESULTS AND DISCUSSIONS

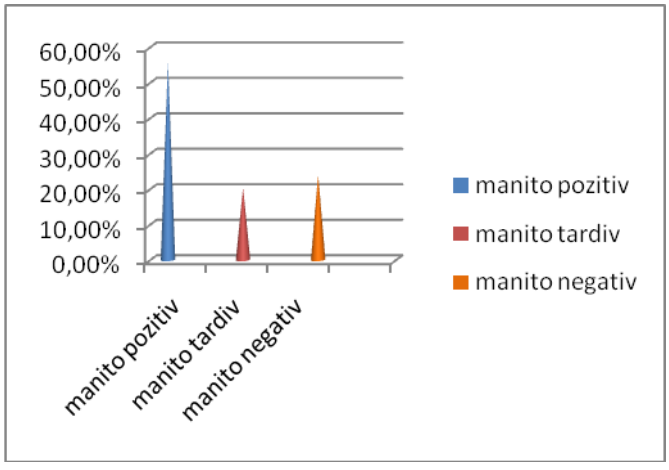
The aspect of the colonies of coagulase-negative staphylococci differs very much due to the age of the culture, some characteristics being clearly defined after 72 – 120 hours of growth.

In regard to the Chapman medium, mannitol positive have increased well, have fermented the mannitol, producing the turning of the pH indicator color in yellow, and the mannitol negative strains have grown but they didn't fermented the mannitol and the pH indicator did not turn the color, it remained pink. In some strains, the fermentation of the mannitol was belated, on 48 hours, respectively.

On agar with sheep defibrinated blood 8% have created round colonies, bulging and non-uniform with a diameter of 10 mm, some colonies were mat and others had a creamy aspect.

The pigment genesis of the colonies was different, depending on the species of staphylococcus, the colonies being pigmented in yellow-orange, yellow-gold, yellow pale or having a white color.

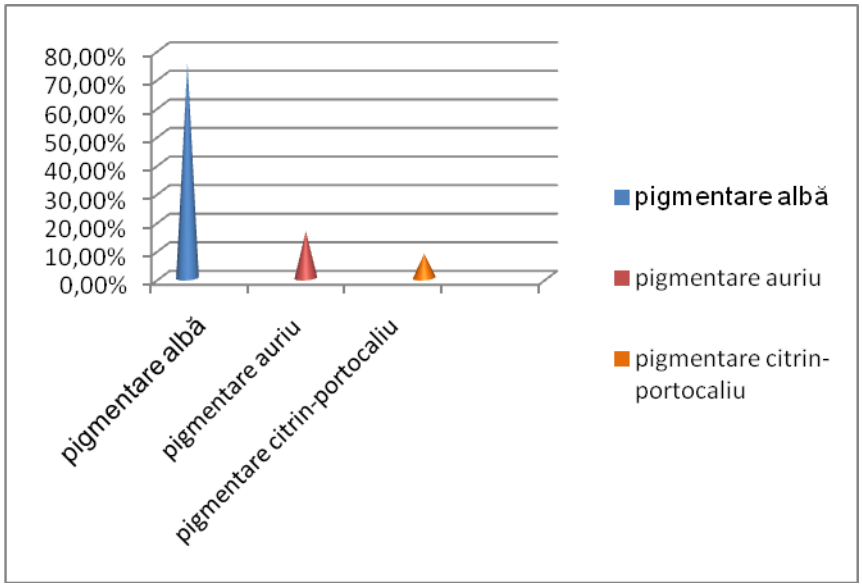
On this medium was appreciated also the type of hemolysis, thus, some strains have produced a total hemolysis, namely β hemolysis, in the form of a circular area around the colonies, other strains have produced an area of incomplete hemolysis, of "warm-cold" type, and other strains were non hemolytic.




Mannitol positive – Mannitol belated – Mannitol negative

Fig.1. Frequency of strains of staphylococci related to the mannitol fermentation

The mannitol positive colonies represented 55,8%, mannitol belated, 20,3% and mannitol negative being represented by 23,9%.




White pigmentation – Gold pigmentation – Citrine-orange pigmentation
Fig.2. Frequency of the pigment type

Also, we observed an ascending of the colonies with white pigmentation, being represented by percentage of 75,20%, followed by the gold pigment, 16,3%, and regarding the citrine-orange pigmentation, it represents and descending, being represented in a report of 8,5%

## CONCLUSIONS

1. The colonies on Chapman medium, mannitol positive have grown well, have fermented the mannitol, causing the turning of the pH indicator color in yellow and the mannitol negative strains have grown but did not ferment the mannitol.
2. On agar with sheep defibrinated blood 8% have created round colonies, bulging and non-uniform with a diameter of 10 mm, some colonies were mat and others had a creamy aspect.
3. Some strains have produced a total hemolysis, namely β hemolysis, in the form of a circular area around the colonies.

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