Microbes play a fundamental role in the preparation of cheese, contributing to its flavor, texture, and preservation. Here's a breakdown of the key microbes involved in cheese-making:

1. **Starter Cultures (Lactic Acid Bacteria):**
    - Lactic acid bacteria (LAB) are the primary microbes used in cheese-making. They convert lactose (milk sugar) into lactic acid through fermentation, which lowers the pH of the milk.
    - Lowering the pH is crucial for coagulation, as it causes the casein proteins in milk to unfold and bind together, forming a gel-like structure. This process is called curdling.
    - Common LAB used in cheese-making include:
        - Lactococcus lactis: Commonly used in many types of cheeses, including Cheddar and Gouda.
        - Streptococcus thermophilus: Used in cheeses that require higher temperatures for production, such as Swiss and Parmesan.
        - Lactobacillus species: Various Lactobacillus species contribute to the flavor and texture of cheeses like Emmental and Brie.
2. **Rennet (Enzymes):**
    - Rennet is an enzyme traditionally derived from the stomach lining of young calves, though vegetarian alternatives are now available.
    - It plays a crucial role in cheese-making by coagulating the milk proteins, particularly casein, to form curds.
    - Chymosin is the main enzyme in rennet that breaks down κ-casein, a protein in milk, to form a network that traps fat and water, creating the curd structure.
    - The resulting curds are then cut and cooked to release whey, forming the basis for different types of cheeses.
3. **Ripening Cultures (Secondary Microbes):**
    - After the curds are formed and whey is drained, some cheeses undergo a ripening or aging process where additional microbes are introduced.
    - These secondary microbes contribute to the development of flavors and textures over time.
    - Examples of ripening cultures include:
        - Penicillium species: Used in blue cheeses like Roquefort and Gorgonzola. They give the cheese its characteristic blue veining and distinct flavor.
        - Geotrichum candidum: Commonly used in soft cheeses like Camembert and Brie, contributing to their white, bloomy rind.
        - Brevibacterium linens: This bacterium is responsible for the orange or red rind on certain cheeses like Limburger and Munster. It also contributes to their characteristic aroma.
4. **Role of Microbes in Flavor and Texture:**
    - The metabolic activities of microbes during fermentation and ripening produce various flavor compounds such as acids, alcohols, esters, and aromatic compounds.
    - Different strains of LAB can produce different flavors. For instance, some produce buttery flavors, while others produce more tangy or sharp flavors.
    - The breakdown of proteins and fats by enzymes and microbes also contributes to the texture of cheese, creating a wide range from soft and creamy to hard and crumbly.
5. **Preservation:**
    - The acidic environment created by LAB during fermentation helps to preserve the cheese, inhibiting the growth of harmful bacteria and molds.

- Ripened cheeses with their specific microbial communities are less susceptible to spoilage and can be aged for extended periods, developing complex flavors.

In summary, microbes are essential in cheese-making for curdling milk, developing flavors and textures, forming rinds, and preserving the cheese. The selection of specific strains and combinations of microbes is a craft that cheese-makers use to create the diverse array of cheeses found around the world, each with its unique taste, aroma, and appearance.