Contribution ID: **40**

Type: **Poster**

Impact of magnetic fields on Bacterial colony formation

Magnetic fields are invisible forces in our environment that can influence even the smallest forms of life. For bacteria, these fields have the potential to change how quickly they grow, how their colonies look, and how they organize into communities. Permanent magnets, in particular, provide a stable source of magnetic fields and are commonly used in experiments to study these effects. To explore this, bacterial suspensions are first prepared and standardized so that each experiment starts with the same number of cells. These suspensions are spread onto nutrient agar plates, which act as a growth surface. Some plates are placed under the influence of permanent magnets that produce static magnetic fields, while others are left as controls without exposure. The plates are incubated under the same conditions, and the resulting colonies are examined for differences in size, number, shape, and appearance. The results show a noticeable impact of permanent magnetic fields on bacterial colonies. In many cases, colonies grown under magnetic influence are smaller, slower to develop, and may even lose their usual pigmentation. The shape of the colonies can also appear irregular. Furthermore, magnetic fields tend to interfere with the bacteria's ability to form biofilms, which are protective layers that help them survive on surfaces. It is found that not all bacteria react the same way, some species like Escherichia coli is often more sensitive to magnetic exposure, while Staphylococcus aureus may be less affected. These changes can be explained by the way magnetic fields interact with bacterial cell processes. Since bacteria rely on electron transport, ion movement, and enzyme activity to survive, the presence of a magnetic field may disturb these delicate processes. It can also trigger stress responses, leading to damage in proteins and DNA, which ultimately alters the way colonies grow. In conclusion, permanent magnetic fields can significantly influence bacterial colony formation by slowing down growth, changing colony appearance, and reducing biofilm formation. The extent of these effects depends on the type of bacteria, the strength of the magnetic field, and the duration of exposure. These findings highlight the potential use of magnetic fields as a safe, non-chemical way to control bacterial contamination in areas such as medicine, food preservation, and industry, opening up new directions for research and practical applications.

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Track Classification: Biological Sciences