Artificial light at night (ALAN) disrupts natural light patterns, affecting how organisms process information and use natural resources. This can lead to ecological consequences at individual, population, and community levels. While most research has focused on the impact of ALAN on land animals and plants, relatively little attention has been given to planktonic primary producers like green algae and cyanobacteria. These primary producers play a crucial role in aquatic ecosystems by influencing water chemistry and serving as the main source of food and energy for other aquatic organisms.

There are a few studies on how ALAN affects various physiological aspects of green algae and cyanobacteria, such as their photosynthetic activity, pigment composition, and respiration rate. However, the ecological consequences of these changes are still unknown. Different species react differently to light intensity and spectral composition. Therefore, the presence of ALAN and differences between moonlight and artificial light can impact competition between green algae and cyanobacteria. ALAN might also indirectly affect the health of zooplankton, like *Daphnia*, that feed on ALAN exposed phytoplankton. Another unexplored question is whether ALAN acts as a selective factor, favoring strains that are better adapted to its presence.

Our project aims to test several hypotheses about the effects of ALAN on the ecology of green algae and cyanobacteria and to explore the relationship between ALAN's impact on their physiological traits and their overall ecology. First, we will test our prediction that ALAN has a stronger positive effect on cyanobacteria than on green algae. Next, we will confirm that the effects of ALAN on green algae and cyanobacteria affect the life history traits of *Daphnia*. We will also test if ALAN serves as a selective factor, promoting strains that are better adapted to its presence.

We will conduct our research using various intensities and spectral compositions of artificial light to reflect the differences in ALAN characteristics documented in the environment. To ensure reliable results, all experiments will be conducted in a controlled laboratory setting. We will analyze the population dynamics of green algae and cyanobacteria both in monocultures and in the presence of competitors, as well as changes in the life history traits of *Daphnia*. Our analyses will include in vivo fluorescence analysis of photosynthetic pigments, pigment composition, respiration rates, fatty acid composition, carbon-to-nitrogen-to-phosphorus ratios, levels of reactive oxygen species, and antioxidant enzyme activity in both green algae and cyanobacteria.

We expect our research to synthesize and expand existing knowledge about the effects of ALAN on the ecophysiology of phytoplankton. Establishing connections between ALAN, competition within phytoplankton communities, and the condition of zooplankton may have both theoretical and practical benefits for environmental conservation. We plan to publish our findings in high-impact journals and hope that our research will be recognized by the scientific community, highlighting the seriousness of light pollution and advocating for measures to mitigate its negative effects on the environment.