**Discussion**

The results of this thesis showed that the degree of teratological deformation of frustules of *E. bilunaris* was positively correlated with increasing Pb(NO3)₂ concentration in the culture medium. The combination of chronic stress with low Pb²⁺ concentrations and suboptimal temperature resulted in a significant increase in deformities compared to the individual stressors. Smaller cells were more sensitive than larger cells, suggesting that the surface-to-volume ratio plays a role in stress perception.

Results are consistent with previous studies that have shown that heavy metals such as Pb²⁺ can affect diatom morphology [citation]. In contrast, suboptimal temperature has been less frequently studied in association with teratologies. Meanwhile, the combination of stressors led to a synergistic effect, supporting the conclusions of the authors [citation], who point to the importance of cumulative stressors in freshwater ecosystems.

The results of this study contribute to a better understanding of the impact of low Pb²⁺ concentrations on diatoms, which are key bioindicators of ecosystems. Identification of specific morphological changes associated with heavy metals can be used in biomonitoring to estimate historical sediment contamination. The sensitivity of smaller cells also highlights the importance of cell size in toxicity assessment.

The main limitation of this study is the laboratory nature of the experiment, which may not fully reflect the complex conditions of the natural environment. Furthermore, although Pb(NO3)₂ concentrations were determined based on preliminary tests, it cannot be excluded that longer exposure or the presence of other contaminants may lead to different results.

Future studies should focus on the effect of other stressors, such as pH changes, or the synergistic effect of heavy metals with organic pollutants. Furthermore, it would be beneficial to use molecular tools to study gene expression associated with frustule formation during exposure to stressors. It is also important to investigate the described effects under natural conditions, and to develop scaling that would be beneficial for field biomonitoring.

This study shows that even low concentrations of Pb²⁺ can have a significant effect on diatom morphology, especially when combined with other stressors such as suboptimal temperature. These findings underline the importance of diatoms as bioindicators and provide a basis for the development of new approaches in biomonitoring.