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Respiration rates and glucose intake by the agglutinated foraminifer *Liebusella goesi* from the Gullmar Fjord (Sweden)

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Benthic foraminifera (marine protists) with a calcareous shell (test) show a variety of feeding strategies including detritivory, herbivory, bacterivory, carnivory or mixotrophic adaptations. However, little is known about the feeding habits of agglutinated foraminifera, which build their tests from sediment particles, embedded in organic cement secreted by the foraminifer. *Liebusella goesi* is a benthic foraminifer with an agglutinated test, which requires stable hydrographic conditions with low seasonal variation. In general, information on the biology or ecology of this species is very limited. Furthermore, there are no data available on foraminiferal metabolic rates and their feeding ecology (energy consumption in calories/time, food consumption rates) of such foraminifera by now.

In this study, we compared the respiration rates of *L. goesi* at *in situ* conditions incubated in sterile seawater with or without 1.5 mM labelled glucose (33 atom% ¹³C/¹²C) as a potential food source. Additionally, we estimated the individual metabolic rates of *L. goesi* specimens from their rate of glucose uptake over time.

Liebusella goesi individuals were collected in August 2021 with the R/V Oscar von Sydow at the deepest spot of the Swedish Gullmar Fjord (Alsbäck deep, 120m), by sampling the surface layer of sediments recovered from multiple box corer hauls. Subsequently, specimens from the 5000 µm - 125 µm sediment fraction were picked under a stereo microscope, in the laboratory at the Sven Lovén Centre in Kristineberg. Seventy specimens were pooled in six replicates per treatment and incubated within glass vials (1.5 mL) filled with either plain sterile seawater or with seawater amended with ¹³C-glucose, and sealed airtight. Finally, simultaneous non-invasive oxygen measurements were carried out over the course of 45 h. Foraminifera incubated with ¹³C-glucose were prepared for elemental analysis and isotope ratio mass spectrometry to evaluate the amount of ¹³C-glucose intake during the experimental period.

The respiration rates of *L. goesi* were in the range of previously observed rates of other foraminifera. *Liebusella goesi* actively fed on dissolved organic carbon in the form of glucose and a significant increase of the respiratory activity of the specimens incubated with the ¹³C-glucose was observed. Metabolic rates of *L. goesi* will be presented in comparison with those of other protists based on data synthesis from other available sources.

The results of this experiment enhance the knowledge about the metabolism of agglutinated foraminifera. However, further experimentation with other species and eventually further variation of incubation factors will be needed, to get a more comprehensive picture of the feeding strategies and metabolic adaptations of agglutinated foraminifera.