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Oxygen Respiration rates of benthic foraminifera measured under laboratory conditions using oxygen microelectrodes

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Oxygen respiration rates of benthic foraminifera are not well documented because of the difficulties to measure them. However, the determination of the respiration rates of benthic foraminifera is important in order: 1) to compare the metabolic rates of different species, of various size, and with different microhabitats in the sediment; 2) to estimate the contribution of benthic foraminifera in the aerobic mineralization of organic matter.

Benthic foraminifera from 4 different natural environments were used: three species from the intertidal rocky shore of Yeu island, two species from the muddy Bay of Aiguillon, two species from the Bay of Biscay and eleven species from the Rhône prodelta (France). Living foraminifera were placed in a small tube, in which oxygen gradients were determined using oxygen microelectrodes. Respiration rates were calculated on the basis of the oxygen fluxes measured in the vivinity of the foraminiferal specimens. Foraminiferal biovolumes were estimated on the basis of the overall shape of the various species (for example, *Ammonia* is assimilated to a half sphere) and the width of the shell walls.

The results show a wide range of respiration rates according to the species (around 90 to 5300 pmol. cell^{-1}.day^{-1}) and a clear correlation with the biovolume of the foraminifera. No clear relationship between respiration rates and microhabitat is observed.

A comparison with previously published data shows that our estimations are generally lower for the small size species. For example, the respiration rate estimations published recently by Nomaki et al. (Journal of Foraminiferal Research, 37, 281-286, 2007) show a range of 900 to 10 000 pmol. cell^{-1}.day^{-1}.

The total contribution of benthic foraminifera in the aerobic mineralization of organic matter is estimated for the studied areas. The first results suggest a minor role of benthic foraminifera in this process, which strongly contrasts with their strong contribution to anaerobic mineralisation of organic matter in the same areas (Pina-Ochoa et al., PNAS, 2009).