

Physiological reactions of aquatic oligochaetes to environmental anoxia

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Abstract

Aquatic oligochaetes are well known for their ability to resist prolonged periods of anoxia. In fact, the observed mortality is more likely to result from laboratory stress (unnatural sediment, starvation, accumulation of toxic substances) than from lack of oxygen per se. *Lumbriculus variegatus* feeds under anoxia at 6°C at a low rate and survives more than 40 days. A sudden transfer into anoxic water, however, results in a cessation of defaecation before the gut is half emptied, whereas the gut is completely emptied under aerobic conditions within 8–10 hours (11°C).¹

Anoxic heat dissipation as measured by direct calorimetry^{2,3} is reduced by up to 80% relative to aerobic rates. The basal rate of oxygen uptake is independent of PO₂ above 3 kPa (15% air saturation), but the active rate shows a high degree of oxygen conformity. Whereas the theoretical oxycaloric equivalent yields an accurate estimation of aerobic heat dissipation in *Lumbriculus*, anoxic catabolism of glycogen explains only up to 60% of the directly measured rates of anoxic heat dissipation in *Lumbriculus* and *Tubifex*. Since unknown bioenergetic processes may be important under anoxia, direct calorimetry is required to assess total rates of energy expenditure in anoxic oligochaetes.¹

References

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