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The interrelated effects of body size and choroid rete development on the ocular O₂ partial pressure of Atlantic (*Gadus morhua*) and Greenland cod (*Gadus ogac*)

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Abstract:

The interrelated effects of body size and choroid *rete* development on the ocular partial pressure of oxygen (PO₂) of the mainly temperate Atlantic cod, *Gadus morhua*, and the exclusively polar Greenland cod, *G. ogac*, were investigated using micro-optode O₂ sensors. Due to a difference in geographical distribution, it is hypothesized that *G. ogac* will possess features favouring visual-metabolic processes in a cold, dark environment. The relative size of the eye was identical between species and exhibited negative body-size scaling. The oxygen-secreting *retia* of both gadid species are extremely well developed and, although variable, recordings of ocular PO₂ were consistently and often greatly in excess of atmospheric pressures (27.7–138.3 kPa). The choroid *rete* was slightly more developed in *G. ogac*, but ocular PO₂ was not significantly different between the two species. Choroid *rete* development scaled isometrically with body size in both species and may explain why differences in body size did not account for any of the variation in ocular PO₂ measures. The hypothesis that polar-fish species exhibit marked visual-metabolic adaptations as a result of their cold, dark environment is not wholly supported by the current data.