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ASSESSING THE EFFECTS OF WARMING ON ANTARCTIC FISH USING PHYSIOLOGICAL APPROACHES

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Antarctic fishes are regarded as the archetypal stenotherms and specialists, tolerating only a narrow range of temperatures and having evolved biochemical and physiological mechanisms to function and survive at sub-zero temperatures. How Antarctic fish respond to increases in temperature is not well understood nor is their ability to cope with, and compensate for, the deleterious effects associated with prolonged elevated temperatures. Physiological studies provide an effective way of predicting and assessing the effects of increasing water temperature on Antarctic fish, both in the short and long term. Determining the thermal dependence of biochemical and physiological processes allows the quantification of acute effects of temperature, whereas acclimation studies provide a means to assess the phenotypic plasticity of Antarctic fish and their ability to thermally compensate for prolonged temperature changes. The cardio-respiratory system provides an excellent system to evaluate the effect of temperature change. In particular the effect of temperature on the factorial scope for cardiac output and gill ventilation provides a useful and revealing measure of physiological performance in fish. Here we present a physiological framework to evaluate and predict the consequences of warming in Antarctic fish and present results from recent work that shows the effects of short and long term increases in temperature on the cryo-pelagic fish, *Pagothenia borchgrevinki*.