WORKING PROJECT TITLE	More than the sum of its parts? Whole animal performance vs. muscle physiology in *Xenopus laevis*
CORE TEAM MEMBER	John Measey
ACADEMIC LEVEL OF THE PROJECT	MSc
PROJECT BACKGROUND	The African clawed frog, *Xenopus laevis*, has become the model amphibian in many fields of biological sciences. Animals from Jonkershoek, in the Western Cape, have been bred and transported to laboratories the world over, becoming the mainstay of enquiries into embryology, biochemistry, cellular studies and genetics (see van Sittert & Measey 2016). The number of scientific fields that use *X. laevis* continues to grow, and with them laboratory colonies and invasive populations (e.g. Measey et al., 2012). Genetic studies of invasions suggest that (almost) all come from the south-western Cape (but see de Busschere et al., 2016). This species, is therefore reasonably well studied in terms of its physiology, both at the whole animal and whole muscle levels (Wilson et al., 2002). However, the natural distribution of this species is probably the most widespread in southern Africa, from the tropical lowlands of Kwa-Zulu Natal to the highlands of Lesotho (3000 m asl; Measey 2004). Moreover, there are at least 4 genetic lineages which are well defined in this region, whose divergence dates back at least 3 million years (Furman et al., 2014; de Busschere et al., 2016). Therefore, there may be important adaptations to the whole animal and whole muscle performance of these animals from different populations. This study aims to ask how *X. laevis* from different populations vary in their performance over different temperatures, at both the whole animal and whole muscle levels. We predict that animals pre-adapted to

	high altitudes will perform better at low temperatures, while those from tropical lowland areas will show the opposite trend. Animals sampled at intermediary locations from the respective genetic clades will be used to determine whether genetics or adaptation are likely to play the most important role. This MSc project requires a student who is capable of conducting experiments at the whole animal level in climate rooms in Stellenbosch University (with John Measey), and whole muscle level using a work-loop technique at Coventry University (with Rob James).
FURTHER READING	De Busschere, C., Courant, J., Herrel, A., Rebelo, R., Rödder, D., Measey, G.J. and Backeljau, T., 2016. Unequal contribution of native South African phylogeographic lineages to the invasion of the African clawed frog, *Xenopus laevis*, in Europe. *PeerJ*, *4*, p.e1659. Furman, B.L., Bewick, A.J., Harrison, T.L., Greenbaum, E., Gvoždík, V., Kusamba, C. and Evans, B.J., 2015. Pan-African phylogeography of a model organism, the African clawed frog '*Xenopus laevis*'. *Molecular ecology*, *24*(4), pp.909-925. Measey, G.J., 2004. Species account: *Xenopus laevis* (Daudin 1802). *Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland*, pp.266-267. Measey, G.J., Rödder, D., Green, S.L., Kobayashi, R., Lillo, F., Lobos, G., Rebelo, R. and Thirion, J.M., 2012. Ongoing invasions of the African clawed frog, *Xenopus laevis*: a global review. *Biological Invasions*, *14*(11), pp.2255-2270. Van Sittert, L. and Measey, G.J., 2016. Historical perspectives on global exports and research of African clawed frogs (*Xenopus laevis*). *Transactions of the Royal Society of South Africa*, *71*(2), pp.157-166. Wilson, R.S., James, R.S. and Van Damme, R., 2002.

	Trade-offs between speed and endurance in the frog *Xenopus laevis*. *Journal of Experimental Biology*, *205*(8), pp.1145-1152.
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