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Thesis abstract

Sex and stress: Is stress both a mediator and a consequence of sex reversal in the central bearded dragon (*Pogona vitticeps*)?

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Among vertebrates, sex-determining systems are diverse and range on a continuum from entirely genetic sex determination (GSD) to purely environmental sex determination (ESD). The central bearded dragon (*Pogona vitticeps*) possesses a heterogametic (ZZ male/ZW female) system of genetic sex determination, but high egg incubation temperatures induce sex reversal, in which ZZ genotypic males develop as female. The biological mechanism by which temperature is translated into a sexual outcome is not fully understood in reptiles but is proposed to involve the vertebrate stress axis, a highly conserved environmental sensory mechanism which generates physiological responses to stress through glucocorticoid hormone production. Here I demonstrate using developmental transcriptomes and chemical manipulation experiments that the stress axis is unlikely to mediate sex reversal, and instead find evidence for the involvement of oxidative stress responses or circadian rhythm regulation in high-temperature sex reversal. The relevance of these molecular studies is contextualised by a range-wide study of sex reversal and population genetic structure which demonstrates the lack of a clear relationship between climate and sex reversal in the wild. I have proposed that the threshold temperature for sex reversal (and thus the underlying genetic network which determines the threshold) varies across the landscape, having evolved in response to higher average incubation temperatures in warmer regions of the species' range. Together, these studies demonstrate that not only is temperature sex reversal in reptiles a molecular process likely driven by sensory mechanisms other than the stress axis, but it also has complex evolutionary dynamics in the wild.

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