The Expression of Two Important Sex-Related Genes in Response to Incubation Temperature in Reeves's Turtle (Mauremys reevesii)

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The sex ratio of Reeves’s turtle (Mauremys reevesii), a temperature-dependent sex determination (TSD) species mainly inhabited in China, is closely related to the incubation temperatures. Sex determination in reptiles is one of the ten top questions in ecology and evolution. Aromatase catalyze testosterone to estradiol. The expression levels of Aromatase in some TSD species are related to the incubation temperature while that in other species are not. Lhx9 (LIM-homeodomain transcription factor 9) is crucial for gonadal development and might be suppressed by excessive estradiol induced by relatively high temperature (32°C). To explore the role of sex-related genes in the sex determination of reptiles, we amplified the partial sequences of Aromatase and Lhx9 and detected the effect of incubation temperature on their expression. We found that, at female producing temperature (32°C), the relative expression level of Aromatase was significantly higher than that in pivotal temperature (29°C) and male producing temperature (24°C) during the thermo-sensitive period. In addition, relative expression levels of Lhx9 in M. reevesii show no significant difference between the relatively high temperature (32°C) and the normal temperature (29°C). Our results elucidated that Aromatase in AKG involves in sex determination and play a pivotal role in female differentiation in M. reevesii. Moreover, our findings denied the hypothesis that relatively high temperature would suppress Lhx9 and potentially the gonad development of M. reevesii. Such results shed important light on the understanding of sex determination in M. reevesii as well as the evolution of sex determining system in reptiles.

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