

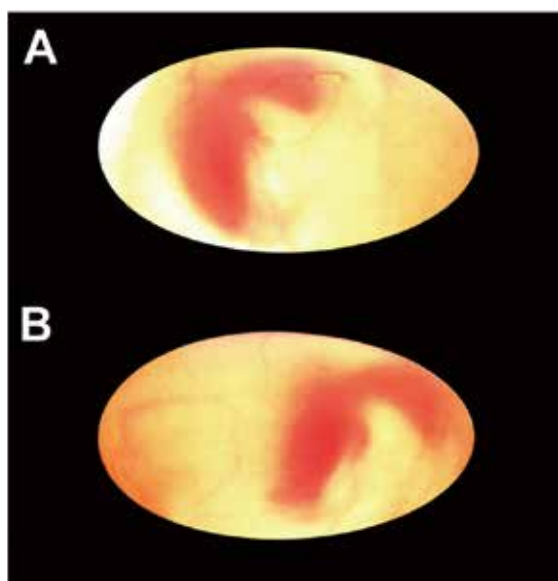
Turtle Embryos Can Influence Their Own Sexual Destiny

Some kinds of animals may be better able to deal with climate change than we expect.

In many species of reptiles, the sex of an embryo is determined not by its genes, but by the temperatures it experiences in the nest. So whether a young turtle, crocodile or lizard hatches as a male or female depends on how warm it is kept during incubation. That sounds like a recipe for disaster as climate change increases global temperatures, creating skewed sex ratios among the next generation. Remarkably, however, new research shows that a reptile embryo is not just a passive victim of global warming. Instead, the embryo can move around inside its egg to find the “Goldilocks Zone” – not too hot, not too cold – that enables it to buffer extreme thermal conditions imposed by changing temperatures.

An international team from China and Australia incubated eggs of Chinese Pond Turtles under a range of temperatures. On some of those eggs, the researchers applied chemicals that prevented embryos from detecting temperature differences, removing the embryo’s ability to select the “Goldilocks Zone”. Those embryos mostly developed as either almost all males or almost all females (depending on incubation temperatures). In contrast, embryos that were able to react to nest temperatures moved around inside their eggs, and about half of them developed as males and the other half as females.

“An ability to buffer the effects of environmental temperature extremes may help to explain how reptile species with temperature-dependent sex determination managed to survive previous periods in Earth history when temperatures were far hotter than at present. The embryos’ control over its own sex may not be enough



Embryonic thermoregulatory behavior affects offspring sex ratios in a Freshwater Turtle (*Mauremys reevesii*): (A) The thermoregulation-inhibited embryos – losing the ability to detect temperature differences – tended to hang in the middle of an egg and mostly developed as either almost all males or almost all females (depending on incubation temperatures); (B) while the embryos with behavioral thermoregulation selected the “Goldilocks Zone” – not too hot, not too cold – and produced offspring with nearly 1:1 sex ratio. (Credit: DU Weiguo’s group, IOZ)

to protect it from the much more rapid climate change currently being caused by human activities – but the discovery of this surprising level of control in such a tiny organism suggests that in at least some cases, evolution has conferred an ability to deal with such challenges,” stated Prof. DU Weiguo from the CAS Institute of Zoology (IOZ), senior author of this study.

(IOZ)

Reference

Y. Z. Ye *et al.*, (2019) The Embryos of Turtles Can Influence Their Own Sexual Destinies. *Current Biology*: CB 29, 2597. doi: 10.1016/j.cub.2019.06.038