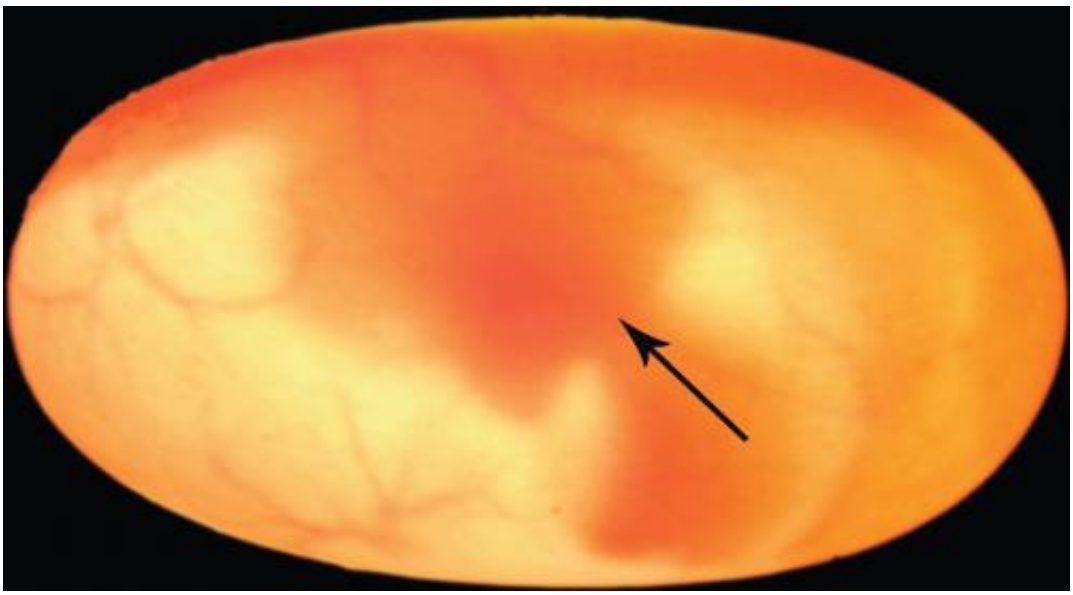
Study proves turtle embryos move themselves within shells to exploit best temperature conditions

June 12 2013, by Bob Yirka



The position of embryonic Chinese pond turtles (C. reevesii) inside eggs, as shown by candling. The arrow indicates the site that we used to score embryonic position within the egg: the point where the neck joins the carapace. Credit: *Biology Letters*, Published 12 June 2013 doi: 10.1098/rsbl.2013.0337

(Phys.org) —A team of researchers working in China has proven that the three-keeled pond turtle embryo is capable of moving itself towards or away from a heat source in order to warm itself or cool down. In their paper published in the journal *Biology Letters*, the team describes how

they subjected turtle embryos to various heat scenarios while monitoring their movements inside their shells to show that the turtles were directing their own actions while still inside their eggs.

Turtles, as most are aware, are cold-blooded animals. They regulate their body temperature by moving themselves to warmer or cooler places. In this new study, the researchers found the same ability applies to turtles while still in their shell.

Biologists have known since 2011 that at least some turtle embryos move about in their shell in response to external heat sources. Another team in China had discovered this ability and had published a paper describing their results. What that team wasn't able to say for sure, though, was whether the turtle embryos were moving themselves or if fluids within the shell were causing the movement. In this new effort, the research team sought to find the answer to that question.

The team set 125 turtle eggs (in groups of five) in incubators set at 26 °C. Then four of the five groups were subjected to various degrees of heat applied at one end of the eggs. The team also set up bright lights next to the eggs that allowed them to see the silhouettes of the embryos inside as they moved. In all but the control group, the team observed that the embryos moved away from the heat source, thus confirming the findings of the team in 2011.

To ascertain whether the embryos were moving themselves or were simply being carried by heated fluid, the researchers ran another similar experiment. This time they allowed 41 embryos to develop naturally for ten days, whereupon, they killed half of them using an injected chemical. After applying heat and waiting for a week, they cracked open the eggs and found that only those turtle embryos still alive had moved away from the source. This they claim, proves that the embryos moved themselves intentionally.

The researchers noted also that the ability to move inside the egg may also be a means of allowing the embryos to choose their own gender—previous studies have shown that temperatures during incubation can determine whether turtles are born male or female.

More information: Turtle embryos move to optimal thermal environments within the egg, Published 12 June 2013 doi: 10.1098/rsbl.2013.0337

Abstract

A recent study demonstrated that the embryos of soft-shelled turtles can reposition themselves within their eggs to exploit locally warm conditions. In this paper, we ask whether turtle embryos actively seek out optimal thermal environments for their development, as do post-hatching individuals. Specifically, (i) do reptile embryos move away from dangerously high temperatures as well as towards warm temperatures? and (ii) is such embryonic movement due to active thermoregulation, or (more simply) to passive embryonic repositioning caused by local heat-induced changes in viscosity of fluids within the egg? Our experiments with an emydid turtle (Chinemys reevesii) show that embryos avoid dangerously high temperatures by moving to cooler regions of the egg. The repositioning of embryos is an active rather than passive process: live embryos move towards a heat source, whereas dead ones do not. Overall, our results suggest that behavioural thermoregulation by turtle embryos is genuinely analogous to the thermoregulatory behaviour exhibited by post-hatching ectotherms.

© 2013 Phys.org

Citation: Study proves turtle embryos move themselves within shells to exploit best temperature conditions (2013, June 12) retrieved 30 May 2024 from https://phys.org/news/2013-06-turtle-embryos-shells-exploit-temperature.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.