

Is it a boy or is it a girl? New method to ID baby sea turtles' sex

March 30 2017



With the increase of global temperatures and climate change, sea turtle nests tend to produce more female-biased sex ratios further increasing their risk of extinction. Despite this risk, very few studies actually verify the sex of individual sea turtles and then compare that data to predictions of sex ratios based on the incubation environment. Credit: Florida Atlantic University

Is it a boy or is it a girl? For baby sea turtles it's not that cut and dry. Because they don't have an X or Y chromosome, baby sea turtles' sex is defined during development by the incubation environment. The nest's thermal environment determines whether an embryo will develop as a male or female. Warmer sand temperatures produce more females and cooler sand temperatures produce more males. To make things even more complicated, in some species of sea turtles, their sexual anatomy is not physically apparent until about a decade or so when they approach sexual maturity.

With the increase of global temperatures and climate change, sea turtle nests tend to produce more female-biased [sex ratios](#) further increasing their risk of extinction. Despite this risk, very few studies actually verify the sex of individual sea turtles and then compare that data to predictions of sex ratios based on the incubation environment. A crucial step in the preservation and conservation of these animals is estimating hatchling sex ratios, which remains imprecise because of their anatomical makeup.

Scientists rely mainly upon laparoscopic procedures to verify neonate turtle sex; however, in some species, anatomical sex can be ambiguous even down to the histological level. To overcome the uncertainties of current methods used to determine the sex of [sea turtles](#), scientists from Florida Atlantic University modified an immunohistochemical (IHC) approach used in freshwater turtles and tested its accuracy in identifying the sex in hatchling loggerhead and leatherback turtles. Results of this study, published in the journal *The Anatomical Record*, show that this method provides a valuable step toward a more reliable method for sex identification of particular importance for leatherback turtles.

"Our IHC approach minimizes the shortfalls of other techniques, especially in the case of leatherback turtles. It adds a reliable character, increases the utility of available samples, identifies the sex of the turtle without the need to sacrifice imperiled species, and does not make

assumptions about the relationship between incubation conditions and the sex ratio," said Jeanette Wyneken, Ph.D., co-author of the study and a professor of biological sciences in FAU's Charles E. Schmidt College of Science who collaborated on the study with Boris M. Tezak, first author and a FAU graduate student, and Kathleen Guthrie, Ph.D., associate professor of biomedical science in FAU's Charles E. Schmidt College of Medicine.

The researchers hypothesized that CIRPB, a RNA-binding protein known to respond to temperature, may show differential gene expression in marine turtle hatchlings that are both well-differentiated and those that are not yet distinctly male or female. To assess the utility of this new approach, they successfully tested the expression of CIRPB using IHC with loggerhead turtle hatchlings and post-hatchlings samples because that species' sex can be identified reliably via laparoscopy and standard histology. Results from their study showed a 93 percent success agreement between the IHC method and the established sex-identification techniques for [loggerhead turtles](#). When they then used the technique with leatherback turtles, they got a 100-percent agreement between the IHC method and established sex-identification techniques.

"The high level of CIRPB expression found in the developing ovaries of marine turtle hatchlings and post-hatchlings also supports our hypothesis that CIRBP may play a role in the molecular pathways of sexual differentiation in marine turtles," said Tezak.

Currently, the most common practices for estimating sex ratios from nesting beaches use nest temperature, beach temperatures, or incubation duration and empirically derived relationships from laboratory data. However, there is little evidence supporting the assumption that these proxies indeed match the primary sex ratios from natural sea turtle nests or rookeries. In fact, sample sex ratios collected for loggerhead [turtles](#) for more than 10 years in Palm Beach County, Fla. show significant

variability, with highly female-biased ratios being produced over a wider range of temperatures than are found in many well-controlled laboratory studies. In addition, in some nests, more males occur than would be predicted by nest temperature alone.

"Evidence suggests that the temperature-sex relationship found in the laboratory is less tight in nature and verification of sex ratios is often insufficient or absent," said Wyneken. "Our IHC method is a breakthrough in hatchling sex identification in [leatherback turtles](#), a species whose reproductive system differentiates more slowly than on other sea turtle species."

According to the Sea Turtle Conservancy, the [leatherback sea turtle](#) is listed as endangered (in danger of extinction within the foreseeable future) under the U.S. Federal Endangered Species Act and worldwide it is listed as vulnerable in 2013 (facing a high risk of extinction in the wild in the immediate future) by the International Union for Conservation of Nature and Natural Resources. The [loggerhead sea turtle](#) is listed as threatened (likely to become endangered, in danger of extinction, within the foreseeable future) under the U.S. Federal Endangered Species Act and internationally it is listed as endangered (facing a very high risk of extinction in the wild in the near future) by the International Union for Conservation of Nature and Natural Resources.

Provided by Florida Atlantic University

Citation: Is it a boy or is it a girl? New method to ID baby sea turtles' sex (2017, March 30) retrieved 13 March 2024 from <https://phys.org/news/2017-03-boy-girl-method-id-baby.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.
