

# What if temperature determined a baby's sex?

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## Background

- The sex of humans is largely controlled by the X and Y sex chromosomes.
- However, in many reptiles and fish, sex is instead influenced by how warm or cool eggs are before hatching. What might life be like for humans if sex was likewise under the sway of temperature?
- The fact it was even possible to control the sex of animals using heat or cold was first uncovered in the rainbow agama lizard in 1966 by French zoologist Madeline Charnier at the University of Dakar in Senegal.
- She found hatchlings from eggs incubated at lower temperatures were female, while those that developed at higher temperatures were male.
- Since then, scientists have discovered other patterns of temperature-dependent sex determination. For instance, with the Hawaiian green sea turtle, females emerge if incubated above a certain temperature and males if below a certain temperature, and if temperatures in nests fluctuate between those extremes, a mix of males and females are seen. According to a 2020 study published in the journal *Bionatura*.
- In contrast, with the American alligator, females develop from extremes of hot and cold and males from intermediate temperatures.

## Temperature Controls Sex Determination

- Temperature Controls Sex Determination in all crocodylians, most turtles, many fish, and some

lizards.

- Within a specific window of time during the embryonic development of these animals, heat or cold can influence the production of sex hormones, which in turn can sway a hatchling's fate.
- Biologist Karla Moeller noted that one cause of temperature-dependent sex determination is an enzyme known as aromatase, which can convert male sex hormones to female sex hormones.
- In animals such as the red-eared slider turtle, heat during a specific developmental stage can increase levels of this enzyme, leading to more females.

### **Unlikely in humans?**

- All known species with temperature-dependent sex determination are both oviparous, or egg-layers, and cold-blooded, meaning their body temperatures change with that of their surroundings.
- However, humans are neither of those things.
- Temperature-dependent sex determination in humans is not very likely because you would need, at a minimum, two different body temperatures – one that would trigger female development and one that would trigger male development.
- But the human body is always at 37 degrees Celsius (98.6 degrees Fahrenheit)
- For temperature-dependent sex determination to exist in humans
  - One possibility is that we somehow become poikilotherms – that is, unable to control our body temperature – much like the naked mole-rat.
  - Another possibility is that instead of live births, we were to somehow lay eggs like a platypus.

**So what might humanity look like if temperature could decide the sex of our offspring?**

- The most important consequence would likely be that it would then be trivial for parents to decide their children's sex
- And this will create risk for the potential for a major imbalance between the sexes in a society.