Not a lizard nor a dinosaur, tuatara is the sole survivor of a once-widespread reptile group

May 12 2017, by Marc Emyr Huw Jones

The unique tuatara, photographed on Stephens Island, Takapourewa. Credit: Paddy Ryan, Author provided

Have you ever heard of the tuatara? It's a reptile that decapitates birds with its saw-like jaws, lives to about 100 years old, and can remain active in near-freezing temperatures.

It's also the sole survivor of a lineage as old as the first dinosaurs.

May 2017 marks 150 years since the tuatara was first recognised not to be a lizard.

Most tuatara exist on windswept offshore New Zealand islands, where they spend their days in burrows or basking lazily in the sun.

In the evening they are more active, and use their large eyes to spot a variety of prey such as beetles, spiders and snails. They also occasionally eat lizards, frogs, baby tuatara and birds – the headless bodies of birds are not infrequently reported from their island homes.

Although capable of bursts of speed, tuatara have a reputation for slowness. They grow slowly, they reproduce slowly and they live for a long time.

Interestingly, they are most active at cool temperatures (5-18°C) that would put many other reptiles out of action. New Zealand lizards have similar traits, suggesting that these characteristics are relatively recent adaptations to local conditions.

The tuatara is often referred to as having a third eye because of a light-sensitive organ on the top of its head, similar to the ones found in many lizards.

Ancient isolation

Ancestors of the tuatara have probably been on land associated with New Zealand since it separated from the rest of the Gondwana supercontinent about 80 million years ago. During that time, they have had to cope with big changes in the region's shape and size (New Zealand may have been mostly submerged 23 million years ago) and, until recently, a cooling climate.

Recent fossils from the past few thousand years show that tuatara were widespread across the mainland until humans arrived (with Pacific rats) about 750 years ago.

Tuatara are now threatened by climate change. This is because the sex of a tuatara is determined by the temperature that their eggs experience – rising temperatures will skew populations towards males.

Mainland reintroductions to cooler latitudes will hopefully reduce this problem. Captive breeding programs are also showing signs of success.

A special place in biodiversity

The initial claim that the tuatara is not a lizard was based on anatomical differences such as the presence of a second row of upper teeth, which is not seen in any lizard.

Subsequent genetic and fossil discoveries have confirmed that the tuatara has a separate heritage.

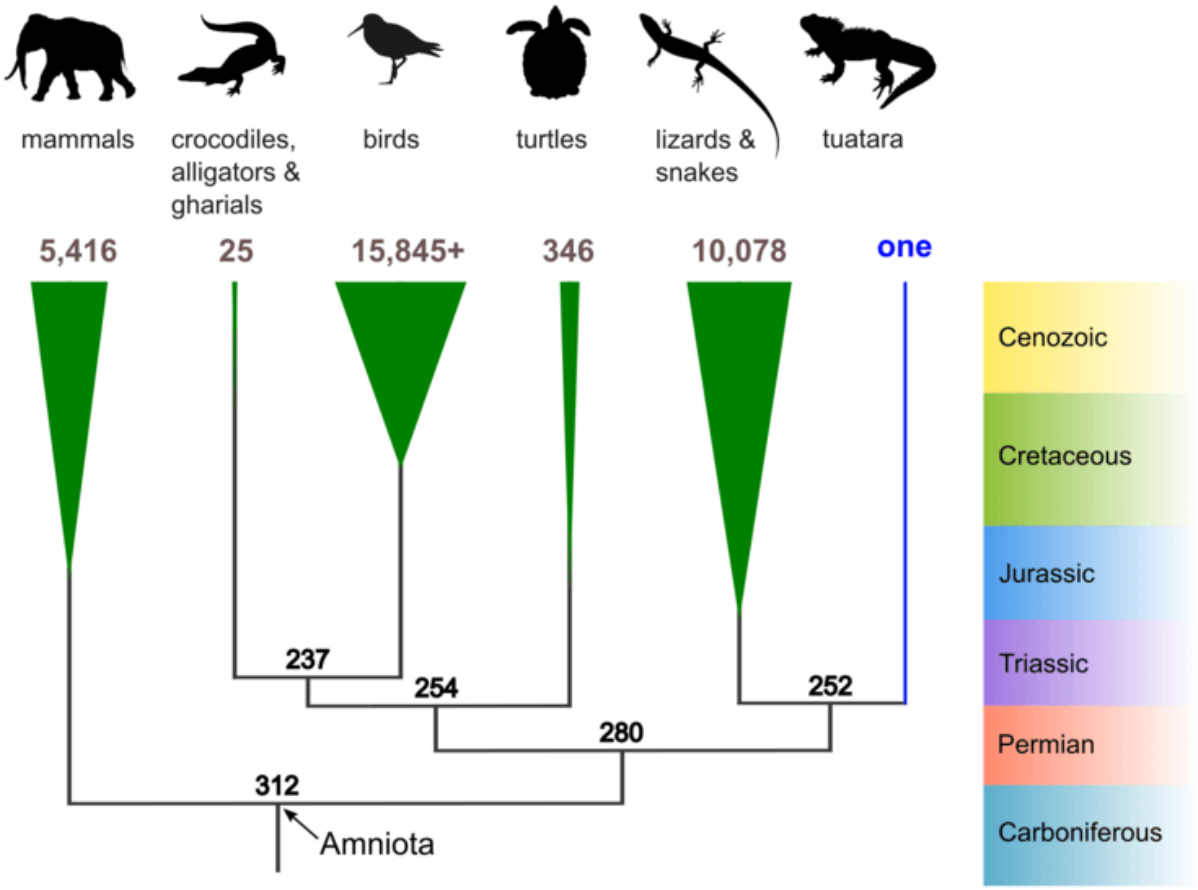
We now know that the tuatara is the only living member of Rhynchocephalia, a reptile group that was diverse and widespread between 240 million and 60 million years ago. Its fossil relatives included small carnivores with scissor-like jaws, large chunky herbivores , and even aquatic forms with crushing tooth plates.

The tuatara is often referred to as a "living fossil" or even a "living dinosaur". Although these labels are not helpful scientifically, they reflect a widespread appreciation that the tuatara has a special place in the animal kingdom.

The animal group known as "amniote vertebrates" includes more than 30,000 species divided between six major radiations: mammals (5,416

species), turtles (341), crocodylians (25), birds (at least 15,845), lizards and snakes (10,078), and (tuatara).

As the only living member of Rhychocephalia, and only living cousin to Squamata (lizards and snakes), the tuatara has an important role to play in understanding the evolution of all animals with backbones.



A tree showing the six major branches of the Amniota. The numbers along the top are numbers of species and the numbers at the branching events are estimate times from TimeTree.org. Animal silhouettes are from PhyloPic. Credit: Marc E H Jones

Recent contributions to science

Despite several hundred research articles on the tuatara, we are still learning new things about this species all the time.

The origin of male genitals

Recent examination of tuatara embryos suggests that although adult male tuatara lack external genitalia (that is, they have no external penis), their ancestors did possess a penis of some kind.

This evidence in turn supports a hypothesis that external genitalia originated just once within amniotes (mammals, birds, crocodiles, lizards, tuatara) but has since undergone dramatic modification and was even lost in some groups of birds as well as an ancestor of the tuatara.

Biomechanics of biting

The frame-like skull of the tuatara has also become an important subject for biomechanics.

Sophisticated computer models have been used to predict muscle activity , bite force, sensory feedback from the jaw joints and stress distribution in the bones during biting.

These models have also shown that the shearing action of the lower jaw involves tooth on tooth contact and that the soft-tissue connections between bones are important for spreading stress around the skull more evenly.

How kneecaps developed

Recently, X-ray micro CT scans of several tuatara specimens helped established which sesamoid bones – structures at joints such as the knee cap – are likely to be relatively ancient and which are relatively new.

Culture, myths and legends

The tuatara is a national icon in New Zealand, where it has appeared on the five cent coin and several postage stamps.

Further afield, it has also given its name to a brewery, musical group, a DC super hero, a backpackers accommodation, a tour company, a scientific journal, a company selling mobile phone covers, and, with no hint of irony, a V8 sports car that can reach a top speed of 444km per hour.

Tuatara are highly important to māori culture. The word "tuatara" is itself māori, meaning "peaks on back" (referring to the crest along its neck and back). Tuatara are regarded as "taonga" (treasure), viewed as guardians of knowledge, and sometimes associated with bad omens.

A curious urban legend associated with the tuatara is that of the cenaprugwirion, a "curious 1-ft-long lizard-like reptile supposedly inhabiting burrows in and around Abersoch in North Wales".

Before tuatara were protected in 1895, they were commonly imported to Europe as pets and curios. Some have suggested these animals might represent escaped tuatara from that time.

Tuatara are frequently in the news. During the 1980s, wild population of tuatara were targeted by poachers who were suspected to be selling them in exchange for drugs.

Henry the tuatara acquired celebrity status when he became a dad at 111

and met Prince Harry several years later.

This article was originally published on The Conversation. Read the original article.

Provided by The Conversation

Citation: Not a lizard nor a dinosaur, tuatara is the sole survivor of a once-widespread reptile group (2017, May 12) retrieved 10 April 2024 from https://phys.org/news/2017-05-lizard-dinosaur-tuatara-sole-survivor.html