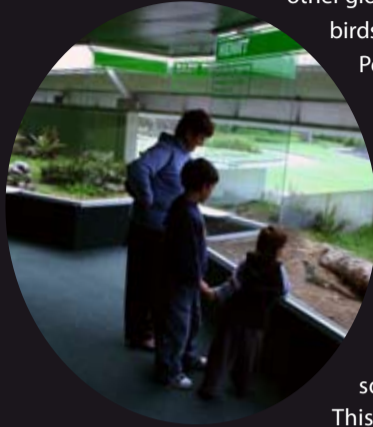




ANCIENT REPTILE

In 1867 Mr. A. Gunther had Tuatara specimens sent to him at the British Museum, London. He found that despite the Tuatara having a lizard-like appearance, it had such different skeletal features it clearly belonged to a separate order. This he called "Rhynchocephalia" meaning "beak-head". The name refers to the beak-like shape of the head. These ancestors date back 225 million years. Some of these were 1.5 metres in length.

Tuatara have since been placed into a new order "Sphenodontia" meaning "wedge-toothed" and found in fossil beds 150 million years old. Geological records show that the *Sphenodontian's* were once wide-spread throughout the world, but most common in South America, Britain, Europe and Africa. Today the Tuatara are only found in New Zealand, other global populations have either evolved into something different, like birds? Or become extinct along with the dinosaurs in the Cretaceous Period some 50-60 million years ago.



TUATARA AT THE SOUTHLAND MUSEUM & ART GALLERY

Southland Museum and Art Gallery applications in the 1940's to the Government to obtain live Tuatara were declined, but with persistence the Museum finally received its first live Tuatara 1961.

The 1990 Museum Pyramid redevelopment incorporated a 200 square meter enclosure to house a growing Tuatara population. This enclosure gave control over climate extremes and provided visitors with optimum viewing opportunities to see live Tuatara.

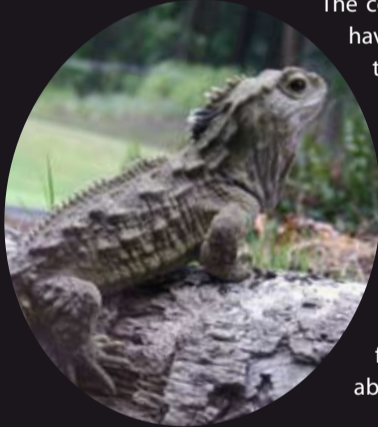
In 1991 the Museum received a colony of one year old Tuatara (*Sphenodon guntheri*) from North Brothers Island in Cook Strait, a separate rare and endangered species with only an estimated 400 surviving in the wild.



In 2006 the Tuatarium roof was replaced with a special Plexiglass UVT acrylic that allows all wavelengths of light, including up to 80% Ultra Violet B emission, essential for Tuatara Vitamin D production which maintains good bone and egg quality.

Since 1984 both Lucy and Mildred have produced eggs every two years, giving the Southland Museum & Art Gallery the world's first regular captive breeding. In 1994, we identified that the Tuatara were producing eggs annually (1989-1995). This event had never been previously recorded and contrasts markedly with Tuatara in the wild that only lay once every 3-4 years.

The common species breeding has been so successful that other zoo's have since received offspring from us, thus removing the need to take tuatara from natural habitats for captivity



CLIMATE

New Zealand's last ice age was some 10,000 years ago. 3,000 - 8,000 years ago saw the big melt down of N Z's Glaciers, with a warm period, 6 to 7 degrees Celsius warmer than today.

I would suggest this warm period was the boom time for all NZ flora and fauna. At that time the beech forests grew at 5,000 feet above

sea level and would have flowered annually, today they only grow to 3,000 feet and flower once 4-5 yearly. Birds like the Kakapo back then would have thrived.

The climate for the last 3,000 years has been moderately temperate. The last 700-900 years has lacked seasonal continuity, in summer we have been experiencing winter like conditions. This is evident in the study of tree growth rings.



NATURAL HABITAT

The gradual rise in sea level until it reached its present level 3-4 thousand years ago, isolated the Tuatara on many of New Zealand's offshore islands. This island isolation has been their savior. Since the arrival of the first humans about 1000 years ago, the range of Tuatara has since declined from both main lands to only 33 offshore islands. The main reasons attributed to this decline are that humans introduced predators and modified their habitat.

Most of the Tuatara islands are difficult to access. Some are cliff-bound and frequently exposed to strong winds. The vegetation is stunted and salt tolerant.

Many of the Tuatara inhabited islands have populations of breeding sea birds. The bird burrows honeycomb the islands'



surface. Although Tuatara are capable of digging their own burrows, some reluctantly share with a seasonally nesting sea bird.

The turning of the soil, with the addition of mineral enriched guano from the nesting birds, creates ideal conditions for ground dwelling insects like weta and darkling beetles, which form a major part of the Tuatara diet. Tuatara will also eat young sea birds, such as priors and petrels. They have also been reported to eat the bird's eggs.



FEW PREDATORS

192-160 million years ago, New Zealand was connected to the great continent Gondwanaland with land bridges, possibly via New Caledonia and Antarctica. At this time, Tuatara and other life forms, such as insects and amphibians, would have migrated to New Zealand. Continental plate movement separated New Zealand before mammals and snakes evolved.

TEMPERATURE

Tuatara do not like temperatures in excess of 28 degrees Celsius and can be active in cool temperatures where other reptiles and lizards are not so active. They have the ability to hibernate if the temperature becomes too cool, below 5 degrees Celsius.

LINODSAY HAZLEY QSM Southland Museum & Art Gallery
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For more information visit our website www.southlandmuseum.com

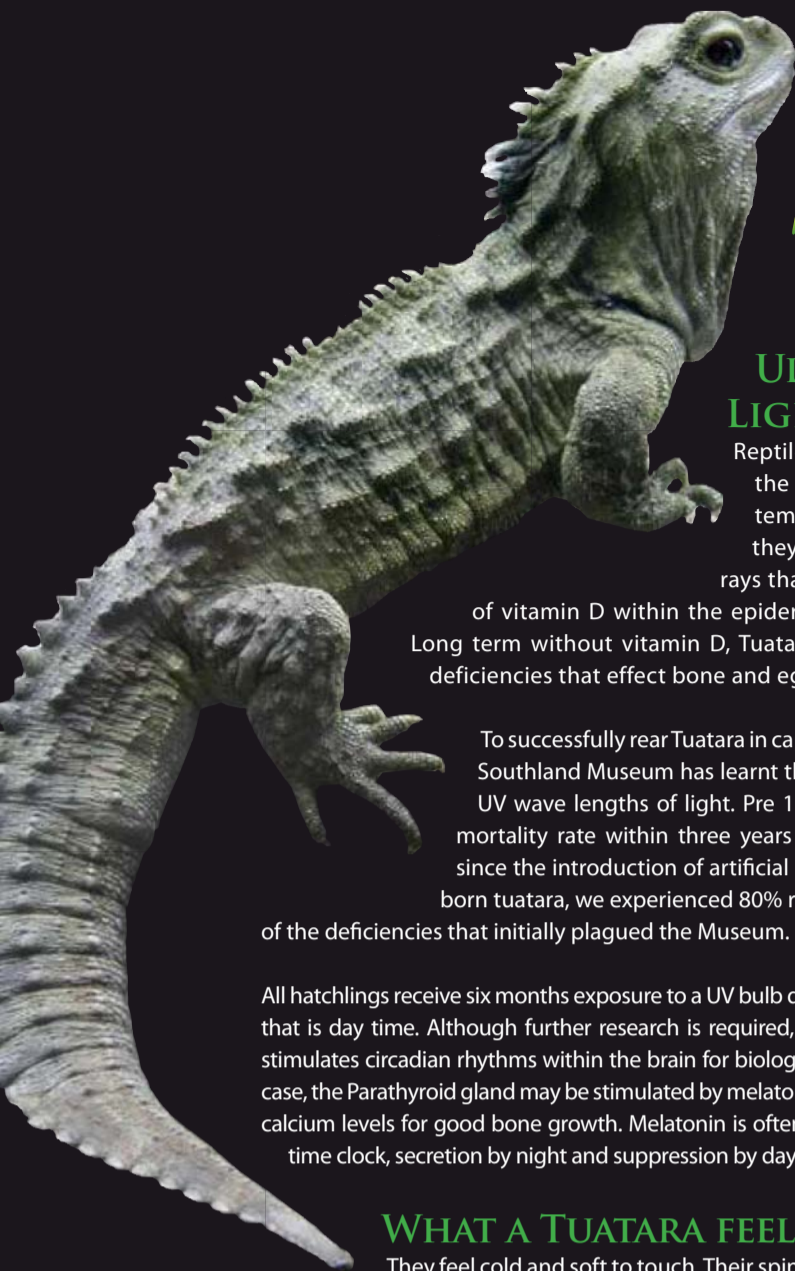


TUATARA

AT THE SOUTHLAND MUSEUM & ART GALLERY



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FACTS ABOUT THE TUATARA

ULTRA VIOLET LIGHT

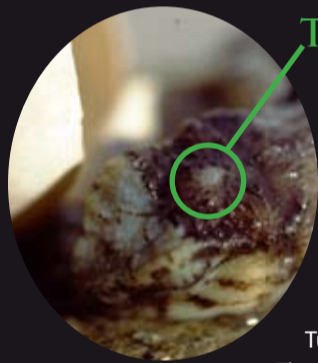
Reptiles require exposure to the sun to regulate their body temperature. As they sun bath they absorb ultraviolet light rays that stimulate the production of vitamin D within the epidermis (layer under the skin). Long term without vitamin D, Tuatara will suffer from calcium deficiencies that effect bone and egg quality.

To successfully rear Tuatara in captivity in artificial conditions, Southland Museum has learnt that Tuatara require access to UV wave lengths of light. Pre 1990, we experienced a high mortality rate within three years of hatching, however now, since the introduction of artificial UV supplementation to new born tuatara, we experienced 80% rearing success with no signs of the deficiencies that initially plagued the Museum.

All hatchlings receive six months exposure to a UV bulb during the day to help confirm that is day time. Although further research is required, it may mean that melatonin stimulates circadian rhythms within the brain for biological functions. In the Tuatara's case, the Parathyroid gland may be stimulated by melatonin to obtaining correct blood calcium levels for good bone growth. Melatonin is often referred to as our biological time clock, secretion by night and suppression by day.

WHAT A TUATARA FEELS LIKE

They feel cold and soft to touch. Their spine is also quite soft and made of keratin the same as feathers and fingernails. It does not have bird talon like grip with its toes but the claws are reasonably sharp and are good for digging burrows.



THIRD EYE (PINEAL EYE)

On top of a Tuatara skull, above the brain, is a third eye. This is a complex organ which actually has a lens and retina. It can sometimes be visible through the skin of newly hatched Tuatara for about six months, but as they grow, the eye becomes covered over with opaque scales. This eye initially may act more like a pineal gland which detects the seasonal changes by sensing the length of daylight and darkness.

TEETH

Tuatara do not have separate teeth but sharp serrations on the jawbone. The upper jaw has a double row of teeth. Their bite is very strong and can hold a vice-like grip for a long period of time.



SKIN SHEDDING

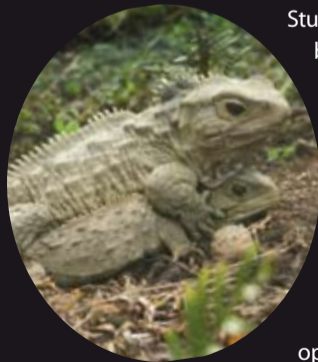
A Tuatara sheds its skin just like a snake or lizard does. This can happen once or twice a year. The skin sloughs off in a pond almost completely but otherwise it can take several days coming off in pieces. The new exposed skin is much more colorful.

DIMORPHISM

Males are distinguished by their size, with an adult male being twice as large as a female. In most cases the males crest are larger. A male can reach a weight of 1000 grams and a female 500 grams

GROWTH

Studies in captivity on Tuatara growth would indicate that 50-60 years may be required to attain full size for a male and 20-30 years for a female. Like lizards, the Tuatara can shed its tail. The tail does not completely regenerate back to its normal size, but is shorter and stunted. Sexual maturity has been at 13 years of age in captivity and in the wild, it is suggested to be 18-20 years



NO PENIS

Unlike lizards, but like Birds, Tuatara do not have a copulatory organ. Fertilisation requires the male to position his cloaca (bottom) opposite the female's cloaca as birds do.



EGGS

The eggs are soft tissue, lightly calcified and can expand as they develop, up to 400% of their original laid size (egg laid weight 4-7 grams and 14-16 grams at hatching). Hatchlings are around 90-100 mm long and weigh 5-7 grams. Studies indicate with Tuatara eggs sex determination is temperature determined.

NOCTURNAL

Tuatara are nocturnal - they become active after sunset. By day they will bask in the sun outside their burrow, yet if a prey item was to walk past it would be consumed. One of the reasons for their nocturnal behavior is the majority of insects they prey on, weta's and darkling beetles are themselves nocturnal.



EATING

Basically anything that moves and can fit into their mouth, and then some. (including their own babies). An adult Tuatara requires very little food for survival consuming one quarter of their body weight per year.

TUATARA SPEED

Generally three speeds are recognizable. The main one is sitting motionless for hours. Second is moving at a sedate slow walk and the third is a high speed short dash that lasts for two or three seconds. In this dash they can cover 5 to 10 meters.



DISPLAYING

This happens February March and April. The males find a high spot to perch and show themselves off. During courtship, the male displays himself by inflating his trunk and throat. His crest is also elevated. He walks in a clock-wise circle around the female, one step at a time, after each step lifting his body off the ground. If the female is receptive small, slow head nodding to the displaying male will usually result in mating.

BREEDING

Tuatara lay clutches of eggs, 5-18 eggs laid under the ground's surface and abandoned to hatch 12-14 months later. On Stephens Island females lay only once every four years and this happens around October or November. Mating occurs in March and April.



TERRITORIAL FIGHTING

Tuatara are territorial with each animal having its own underground burrow. The dominant (largest) Tuatara will go where ever they please.

Fighting is a similar display to mating, but the throat is more inflated and the movements more rapid, (3-4 second burst of action, rest 10-20 min before next bout). Fighting Tuatara will strategically move side by side, lunging at one another's neck or head. They also vocalize a 'croak' sound as they attack or break out of a vice-like bite of an attacker,

TUATARA SENSE

Tuatara are very visual animals. They see movement and even though they don't have external ears like lizards, they still have good hearing and sense ground vibrations. They do not have a good sense of smell.

