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Pyxis arachnoides arachnoides, the common spider tortoise, photographed in Tsimanampetsotsa National Park on the southwestern coast of Madagascar.
Photo © 2018 by Charles J. Sharp

featured species

Spider Tortoise, *Pyxis arachnoides* (Bell 1827)

The Malagasy Spider Tortoise

by M. A. Cohen

Inhabiting a narrow strip of coastline in southern Madagascar, the spider tortoise, *Pyxis arachnoides*, is one of only two species in the genus *Pyxis*. The flat-tailed or flat-shelled tortoise, *P. planicauda*, is the other species in the genus *Pyxis*, and it is endemic to western Madagascar. Both *Pyxis* species are included on the World Atlas's "**The Nine Species of Tortoise on the Brink of Extinction**," according to the IUCN Red List of Threatened Species.

Small in size, the spider tortoise is a species of tortoise in the Testudinidae family. The genus name *Pyxis* derives from the Greek root word *pyxi-*, meaning a box, and the species name *arachnoides* derives from the Greek root word *arachni-*, meaning a spider or a spider web.

The term "Malagasy" is a noun or an adjective that refers to an inhabitant of the island of Madagascar; it is also the name of the Austronesian language spoken on the island.

Description

Rarely exceeding 6 inches (15 centimeters) in carapace length, the spider tortoise is the smallest tortoise species native to Madagascar. The female common spider tortoises typically average 5 inches (13 centimeters) in length, while the slightly smaller males average 4.5 inches (11 centimeters) in length (Smithsonian).

Brown or black in background coloration, the species' carapace displays yellow or tan, radiating patterning on each vertebral and pleural scute that resembles a spider's web. There is considerable variation in the carapacial patterns of the species. It is these web-like carapacial markings that give the spider tortoise its common name.

The plastron coloration and the range of motion of the plastral hinge vary by subspecies, and are

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described in more detail in the "Subspecies" section below.

The head of the spider tortoise is brown or black with yellow speckling, and its limbs and tail are typically brown.

Besides being slightly smaller than the female, the male spider tortoise has a longer, thicker tail that features a more pronounced terminal spine.

Subspecies

Biologists currently recognize three subspecies of *Pyxis arachnoides* based on their geographic variations.

- ***P. arachnoides arachnoides***, the common spider tortoise, was scientifically described by English zoologist Thomas Bell (1792–1880) in 1827 and was the only recognized species of *P. arachnoides* for over 40 years.

Having the largest range of the three subspecies, the common spider tortoise "occurs along the southwestern coast of Madagascar in the vicinity of the Onilahy River, which virtually splits its range into northern and southern portions" (Naturalis Biodiversity Center).

The plastron of *P. a. arachnoides* is solid yellow in color and features a mobile anterior hinge that the tortoise can close to meet its carapace, affording the animal some protection against predators.

- ***P. a. brygooi***, the northern spider tortoise, was formally described in 1972 by Vuillemin and Domergue. It occupies the northernmost portion of the spider tortoise range "southwest of the Mangoky River between Morombe, Lake Ihotry, and Fanemotra Bay" (Naturalis Biodiversity Center).

The plastron of this subspecies is yellow with some dark blotching, and its anterior hinge lacks mobility.

- ***P. a. oblonga***, the southern spider tortoise, was described by British zoologist John Edward Gray (1800–1875) in 1869. It occurs, as its common name implies, in the southernmost portion of the species range "along the southern coast of Madagascar from La Linta to Lake Anony" (Naturalis Biodiversity Center).

The plastron of *P. a. oblonga* is yellow with some dark pigmentation and a mobile anterior hinge that allows the tortoise to close its plastron to its carapace for self-defense.

Range and Habitat

Inhabiting the arid, deciduous, tropical forests and the coastal sandy regions of Madagascar "from the Mahajamba River southward around Cape Sainte-Marie almost to Fort-Dauphin" (Naturalis Biodiversity Center), the three spider tortoise subspecies usually occur in locations with 30 to 50% canopy coverage to better regulate their body temperatures (Anon, Smithsonian National Zoo). The species' range, which extends from coastal Madagascar to 16 to 80 miles (10 to 50 kilometers) inland, is dominated by xerophytic[1] spiny vegetation, primarily succulents and shrubs, coupled with sparse, irregular rainfall.

Natural History

Because it has not been well-studied, the life cycle of *P. arachnoides* in the wild is largely unknown. According to *Pyxis* authority Ryan C. J. Walker, "*P. arachnoides* has, until recently, been almost completely overlooked by the scientific and conservation community."

In the absence of hard evidence, biologists estimate that the species lives some 70 years.

P. arachnoides is primarily active during the wet season which, in Madagascar, occurs from November to April. During the dry season, roughly May to October, the species will typically enter a period of summer dormancy called estivation when they commonly burrow into the sand in their habitats.

The term 'fecundity' refers to the ability to produce an abundance of offspring. With the onset of the wet season, spider tortoises become active and set out to search

[1] **xerophyte** ['ze-roh-fyt']: a botanical term describing a type of plant that requires very little water.

Two spider tortoises. The heavily spined plant on the right side of the image is the trunk of a species of *Pachypodium*, a genus of succulents native to Madagascar and southern Africa. The *Pachypodium* is typical of the xerophytic vegetation that occurs in spider tortoise habitat. Public domain.

for mates. Researchers characterize the spider tortoise as being a species of *low* fecundity. The female usually lays a single egg per clutch but the number of clutches per breeding season is not known. The species' eggs incubate for some 220 to 250 days prior to hatching.

Foods consumed by spider tortoises include both young and dried leaves, fallen fruits and flowers, plant roots, insects, and the dung of larger animals that often contains insect larvae. At least one subspecies, *P. a. arachnoides*, has only been observed eating during the warm, wet season (Walker, et.al 2008).

Threats

Beginning in 2014, *P. arachnoides* is categorized as Critically Endangered on the IUCN Red List of Threatened Species. This designation resulted from several factors that adversely affect spider tortoises.

Habitat destruction, degradation, and fragmentation because of "conversion for agriculture, charcoal production, human-induced wildfires, and alien invasive plants" pose significant threats to spider tortoise populations. Researchers surmise that some 80% of spider tortoise habitat has been compromised.

The northern subspecies, *P. a. brygooi*, is considered the most threatened of the three subspecies. The northern subspecies does not live in legally protected areas (i.e., parklands or wildlife reserves) so it is particularly susceptible to habitat loss and human exploitation.

Although spider tortoises are protected under Malagasy law, they are illegally hunted and harvested for food locally, for the Asian traditional medicine markets, and for the international exotic pet trade.

Conservation

In 2005 *P. arachnoides* was uplisted to Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Appendix I is part of an international agreement between signatory counties that restricts commercial trade to varying degrees in listed fauna and flora in an attempt to ensure species survival in the wild. Currently 182 nations and the European Union have signed on.

The CITES agreement grew out of a resolution adopted in 1963 at a meeting of the International Union for the Conservation of Nature (IUCN), a global organization that assesses the status of the natural world. The IUCN maintains the Red List of Threatened Species, in which *P. arachnoides* is categorized as Critically Endangered, the last category before Extinct in the Wild.

Nationally, since 1960 Madagascar has a law protecting spider tortoises from exploitation. Several protected areas and reserves exist in country. A breeding center run by the French non-governmental organization *Village des Tortues* at Mangily-Ifaty that seeks to protect both radiated and spider tortoises (*Astrochelys radiata* and *P. arachnoides*), both occurring in the breeding-center area.

A spider tortoise photographed on Île Sainte Marie, a small island off the east coast of Madagascar that is now known as Nosy Boraha, This individual is more than likely a captive, as the species is not native to Nosy Boraha. Photo © 2018 by JialiangGao

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The Tortoise Palace

Story by Emma Baldwin, Primary Wildlife Rehabilitation Animal Care Keeper, The Living Desert
Photographs by Emma Baldwin except as noted

Desert tortoises waiting to be adopted just got an upgrade to their temporary housing! The Living Desert's Native Wildlife Conservation Program (NWCP) received a $2,500 grant from the California Turtle and Tortoise Club to help fund renovations to an existing outdoor space. The vision was to create a more suitable habitat for the tortoises.

The tortoise yard, prior to renovation, featured five long runs. A large palo verde tree (*Parkinsonia florida* = *Cercidium floridum*) spans the tortoise yard.

The Living Desert Zoo and Gardens is located in Palm Desert, California and is accredited by the Association of Zoos and Aquariums (AZA). The NWCP is the Zoo's wildlife rehabilitation program, and it includes the Desert Tortoise Adoption Program. The Low Desert Chapter of the California Turtle and Tortoise Club (who provided the grant) and the NWCP collaborate to care for and adopt surrendered pet desert tortoises to qualified individuals or families.

Healthy adult tortoises that meet adoption criteria live in the outdoor yard, unofficially called the "Tortoise Palace." The yard is located behind the zoo's wildlife hospital and can house up to six tortoises. It is surrounded by tall brick walls, with a natural desert dirt floor and an open-air top. There is a large palo verde tree in the middle of the yard. Four of the six tortoise pens surround the tree, while the other two pens are located on the side of the yard. The yard is equipped with a hose and concrete pad for cleaning trays and dishes.

Prior to renovations, the yard had five long, narrow tortoise runs, each of which had an artificial burrow made of a plastic tunnel leading into a modified irrigation box. Shadecloth was clipped over the front of each burrow to provide additional shade. The walls between runs were made from corrugated panels which were wired to garden stakes.

Renovations addressed a few known issues with the original design. The walls between the pens were not buried in the ground, so sometimes a tortoise would dig into its neighbor's pen. It is important to keep individuals separated so there is no chance for captive breeding or fighting between tortoises. Also, the shadecloth did not provide adequate shade or cooling for the tortoises. The brick walls surrounding the yard hold in additional heat, on top of the high summer temperatures (115°F), and staff worried that the tortoises could over-heat, even in their burrows.

Members of AmeriCorps Gold 2 group pose in the tortoise yard. Photograph by Dr. James Danoff-Burg.

The new design features six rectangular pens, four 12' x 10' and two 10' x 8'. The walls around and between pens are constructed of 3–foot-tall Ondura corrugated

Artificial burrows were installed prior to setting pen walls.

AmeriCorps volunteers start digging the trenches for the pen walls.

asphalt panels attached to fence posts. Approximately one foot of the panel is buried beneath the dirt, while the rest of the panel is above ground. Staff and volunteers step over the walls to clean the pens. The top portion of the panels are reinforced with metal tubing to add support. There have been no issues with tortoises digging under the walls now that a portion is buried below the dirt.

A new feature to each pen is the addition of a roof over the burrow. Each roof is a 5' x 4' panel of Ondura corrugated asphalt secured to redwood posts. The roof covers a 3' corrugated tube that leads into the burrow, as well as the space in front of the tube. The shadow from the roof also shades the burrow box during the heat of the day. A PVC mister system runs along the wooden frame under each roof, offering additional cooling on warm days. The pens have individual mister controls, so water is not wasted if any pen is not being used. Misters are generally set to run for the hottest six hours of any day that is above 95°F (most days in the desert) and are turned off when the humidity exceeds 30% (rare for the desert). With misters running on a hot day, the area surrounding the burrow is kept significantly cooler, so tortoises don't risk overheating!

The irrigation box burrows from the original design were upgraded to a more heavy-duty model of water meter boxes, to which maintenance staff added lid handles for ease of access. Strong corrugated plastic tubes that had been donated to the zoo were used as new tunnels into the boxes. The tubes are 16" and 18" wide and the boxes are 20" and 24". The boxes were cut to nicely rest the tubes inside. Approximately half of the tube and box are buried below the dirt to help with insulation. The boxes are positioned slightly behind each roof so that staff and volunteers can easily access tortoises in their burrows, or clean/replace the dirt inside.

Each pen has ample room for a tortoise to roam around, with options for direct sunlight and shade. Staff has room to service each pen and the addition of a second garden hose in the yard allows the easy provision of soaking dishes. Staff gardeners added native plants to each pen and the tortoises regularly receive enrichment items to further stimulate their lives. Favorite enrichment includes whiffle balls with dandelion greens and prickly pear pads.

None of the renovations would be possible without the hard work of a group of AmeriCorps volunteers! From March 19–21, 2019, this group dug trenches and placed wall panels and fence posts, moved dirt to fit the burrows and tunnels, and helped level out the pens once digging was complete. Zoo maintenance staff was instrumental in ordering, cutting, and organizing building materials and helping AmeriCorps volunteers get everything into place. The grant from the CTTC funded materials and the total project cost was $4,681 including labor.

NWCP staff is thrilled with the outcome! The "Palace" was completed just in time for brumating tortoises to awaken and enjoy their new living space. The renovated yard has been used for one season (March-November 2019) with great success. The tortoises seem comfortable and use their burrows daily when the temperatures rise. They are cool to the touch even on the hottest days and several walk through the misters regularly. They rearrange dirt inside their burrows, but do not attempt to dig between pens, or out of their pen.

The opportunity to improve animal housing is always exciting, and NWCP staff is happy to provide

A close up view of the modified water meter box serving as part of the artificial burrow.

The four largest tortoise pens, post-renovation, featuring roof structures over the burrows.

better and safer habitats for this amazing species! A special thank you to the Low Desert Chapter of the CTTC, Dr. Andrea Goodnight, the conservation department, and maintenance and gardens staff for your support of this project. The NWCP would be happy to share more details of the project with anyone who is interested. If you have any questions or comments, please email **ebaldwin@livingdesert.org**

For more information and directions to The Living Desert Zoo and Gardens, please visit its website: **https://www.livingdesert.org**

◀ A desert tortoise enjoys the sunshine in its new temporary home.

▶ A desert tortoise enjoys the cooling shade provided by the roof structure over its burrow.

Foothill Chapter
Annual Plant Auction
April 24 at 7:00 P.M.

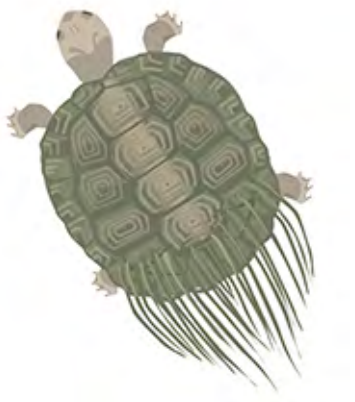
A wide variety of plants and trees will be available at the annual plant auction! Donations for the auction come from various plant nurseries, pond plant gardens for aquatic turtles, and horticulture/agriculture schools. Members will also provide their specialty homegrown plants.

Plant donations will consist of a large variety of California native plants,"tortoise friendly" plants, cacti and other succulents, exotic plants, hard-to-find plants, trees, shrubs and pond plants for aquatic turtles.

This is a Foothill Chapter fundraising event so that we may continue our mission to care for and find forever homes for our "shelled friends," as well as providing education/outreach programs to the public.

The annual plant auction will take place in the Palm Room at the Los Angeles County Arboretum and Botanic Garden, 301 North Baldwin Avenue, Arcadia, California 91007.

Questions? Contact Robin Robb, Foothill Chapter president, at (951) 359-3003 or send an email to **sgrpilot@hotmail.com**



Fun with Photoshop images created by Robert Parker

Founding member and current president of CTTC's Ridgecrest chapter, Robert Parker displays his creative skills in these original images produced with Adobe Studio's digital imaging program Photoshop.

▲ A sulcata tortoise dwarfs the Trona Pinnacles rock formation east of Ridgecrest, CA. The Trona Pinnacles have been used for filming Star Trek, Planet of the Apes, Land of the Lost, and lots of other sci-fi has been done there.

▲ A desert tortoise takes a sunset stroll past the Kerr McGee Center in Ridgecrest, CA.

▲ A diamondback terrapin observes the clouds while wading through floodwaters on Balsam Street in Ridgecrest, CA. Balsam Street often floods when heavy thunderstorms occur in the region.

▶ A tarantula stalks a Bureau of Land Management (BLM) crew surveying for bats at an proposed mine restoration site. The crew members are Pat Brown Berry, a leading bat expert in the western U.S., Lisa Lavelle, a biologist who is the part time Naturalist at the DTNA, and Shelley Ellis, who was a biologist at BLM.

the Turtle's Garden
planting for chelonians
by M A Cohen

Bougainvillea species
Bougainvillea

Bougainvillea blossoms. Brightly colored, papery, petal-like bracts in colors of yellow, red, and pink surround clusters of three white, inconspicuous true flowers. Photo © 2014 by Mokkie

The extravagantly colorful vines of the bougainvillea species are a spectacular addition to gardens in equatorial, subtropical, and even temperate-region gardens worldwide.

The genus name *Bougainvillea* derives from the surname of an admiral in the French Navy named Louis Antoine de Bougainville (1729–1811) who circumnavigated the globe in the 18th century. During that extensive voyage, de Bougainville and his crew discovered the vine that was subsequently named *Bougainvillea* in the region now known as the South American nation of Brazil.

While there are well over 200 species of *Bougainvillea* worldwide, the genus is known to hybridize freely in the wild and in cultivation. Horticulturists have developed the modern, commercially available varieties from a hand full of naturally-occurring species.

Description

A fast-growing, rambunctious, woody vine, bougainvillea grows 15 to 40 feet (5 to 12 meters) depending on the variety. Dwarf and shrub-like cultivars, many ±5 feet (2 meters) in height and spread, are also available commercially for smaller gardens and containers.

The bougainvillea "blossom" is composed of two elements. Bracts, which are actually modified leaves, are the three comparatively large, paper-like components of the bougainvillea "blossom" that provide its vibrant colors. Ranging from pure white to pink, lilac, apricot, yellow, orange, red, magenta, and purple, the bracts surround three inconspicuous, creamy-white true flowers, the other component of the "blossom."

The vines of bougainvillea are densely covered in evergreen leaves that are somewhat heart-shaped, medium green in color, and some 2.5 inches (6 centimeters) in length (Brenzel, ed. 2012).

Located at the base of each leaf, sharp thorns make pruning the bougainvillea a bit tricky. Coating each thorn is a toxic substance that can cause contact dermatitis if it pricks the skin. Thornless cultivars such as 'Miss Alice' and 'Silhouette' are available for sale.

Bougainvilleas attain peak bloom in summer in most areas. Where winters are mild, the species will bloom from spring through fall and even into winter.

Cultivation

Bougainvillea species typically require full sun and well-drained soil for best performance. White- and yellow-flowering varieties generally benefit from some light shade in areas with the hottest summers.

Bougainvillea thrives in areas in which winters are mild and freezing temperatures are unlikely. The plant will survive the occasional cold snap during which freezing temperatures are short-lived, i.e., several hours. Once all danger of frost has passed, hard-prune the damaged vines to encourage new, healthy growth.

While the bougainvillea is not finicky about the texture of the soil, its ideal soil would be a loam (equal parts sand, silt and clay). Added humus (organic matter such as compost) will benefit the plant, providing nutrients at the root level as the humus breaks down.

Ample water after planting aids the bougainvillea in becoming established in the garden. Once this is accomplished, usually after one season of growth, the vine becomes quite drought-tolerant, and horticulturists recommend moderate to average watering only. Too much water can cause yellow or tan spots on the leaves, and possibly the loss of leaves.

Apply a balanced fertilizer (equal parts nitrogen, phosphorus, and potassium) at one-half the label strength once a month during the season of active growth (Spengler).

Any time of year, tip pinching will keep the bougainvillea compact. More extensive pruning should be done when flowering has slowed down or ceased, or when all danger of frost has passed.

Although the bougainvillea plant is considered non-toxic, the coating on its thorns can cause contact dermatitis if the thorns pierce one's skin. When performing a heavy pruning, gauntlet gloves that cover the forearms are useful to protect the skin against injury. If the skin is scratched or pierced, cleanse the wound and apply a hydrocortisone cream to reduce pain, itching, and swelling (Reed).

Because it grows without tendrils, flexible stems, or any other means of climbing, *Bougainvillea* requires attachment to a building wall, strong fence, heavy trellis, sturdy arbor, or the like for training upward. It is necessary to fasten the vines to the support structure during establishment before the vines become stiffened with woody tissue. Without support, the species grows as a sprawling ground or bank cover.

Close-up of a bougainvillea blossom's magenta bracts and creamy-white flowers. Photo © 2006 by Marina Jacob

Dwarf varieties of bougainvillea are suitable for smaller gardens, containers, and hanging baskets (Brenzel, ed. 2012). Additionally, the dwarf and shrub-like varieties adapt especially well to the extensive pruning and training needed for bonsai and topiary creations.

Landscapers advise against planting bougainvillea near swimming pools or in high-traffic areas of the garden to prevent injuries from its thorns. Alternatively, conscientious pruning, keeping the vines well above the heads of adults, will keep both people and pets out of harm's way.

Bougainvillea is often planted along the perimeter of a property for security purposes, as its thorns are an effective deterrent to intrusion.

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Killing gods: The last hope for the world's rarest reptile

written by Jeremy Leon Hance and posted on **Mongabay.com** on 7 January 2020

❍ After decades of dams, overhunting and pollution the Yangtze giant softshell turtle is down to three known individuals.

❍ But conservationists say if they can just located a male and female, survival for the world's biggest freshwater turtle is still possible.

❍ The plan would be to capture the animals and keep them in a semi-wild captive state, but more funding and resources are needed to move forward.

Eighty-eight-year-old Le Huy Hoanh stands up from his bench and carefully poured tea in rural Vietnam, and mimes for us how he used to kill gods. With his long spear and a net flanked in cruel hooks, Hoanh was known for decades in his little village as an able hunter of the Yangtze giant softshell turtle (*Rafetus swinhoei*).

Hoanh looks spry and healthy for an octogenarian, speaking animatedly in Vietnamese. It's not difficult to imagine him as a younger man, catching and killing the world's biggest non-marine turtle, weighing upward of 200 kilograms (440 pounds) — now perhaps the most endangered animal on the planet.

In Vietnamese mythology, the Yangtze giant softshell turtle is also the living representative of the Great Turtle God, Kim Qui. The story goes something like this: Kim Qui's master, a deity called the Dragon King, gave Emperor Lê Li his legendary sword, known as "Heaven's Will." With it, Lê Li freed Vietnam from a thousand-year rule by the Chinese. After his success, he was approached by Kim Qui, who asked for the sword back for the Dragon King. Lê Li handed over the legendary sword to the Turtle God and named the spot "The Lake of the Returned Sword," or Hoan Kiem Lake.

While the last turtle god of Hoan Kiem perished in 2016 ("It was like losing part of our culture," Hoang Van Ha, a conservationist with the Asian Turtle Program, or ATP, told *The New Yorker*), the species is not wholly gone — just almost.

A Yangtze giant softshell turtle in Vietnam. Image by Phuongcacanh via Wikimedia Commons (CC BY-SA 3.0).

Today, scientists know for sure of three animals: one in captivity (male) and two in the wild (sex unknown), but not inhabiting the same lake. The only known female died in captivity in April of last year, making the search for another female paramount.

Still, Tim McCormack, the head of the ATP headquartered in Hanoi, isn't despairing. He says there's still a chance to save this species — if we act quickly.

With only three known animals still alive, time is of the essence. The captive male, in China, may be incapable of breeding. In Vietnam, there has long been an individual in Dong Mo Lake, but in 2018, the ATP confirmed another animal in the wild: one in Xuan Khanh Lake. And McCormack suspects others may still be hiding in Vietnamese lakes and rivers, and maybe even across the border in Laos. We just need to find the survivors, catch them, and bring a breeding pair together, before the situation really becomes too late.

"The possibilities for recovery are quite high," McCormack tells me as we drive through the manic Hanoi traffic. He says a female can lay 30 to 40 eggs in one clutch, and more than one clutch a year.

With just one healthy pair, and a bit of luck, the global population could go from three to more than 50 in 12 months' time.

Dong Mo Lake

Just an hour outside Hanoi's bustles lies quiet Dong Mo Lake, a scenic, sprawling body of water in the shadow of the heavily forested Ba Vi Mountain. Dong Mo isn't really a lake at all, but a 1,400-hectare (3,460-acre) reservoir, created when the Red River was dammed more than 40 years ago.

The dam is how McCormack and his team suspect the turtle god found its way here. McCormack and his team believe that Yangtze giant softshell turtles, as the name suggests, aren't really lake turtles; they're river and wetland turtles. Historically, they inhabited the Yangtze River in China and the Red River in both China and Vietnam, as well as adjacent wetlands. In their natural habitat, the turtles probably migrated through the rivers and nested on sandbanks in wetlands.

McCormack believes that when the dams were built, several turtles became stranded in lakes and reservoirs like Dong Mo. These water bodies may be suboptimal habitat — we don't know — but

they've certainly made it impossible for turtles in different lakes to meet and mate.

At the same time the turtle population crashed. As people built dams, dumped pollution and overfished East Asia's great waterways, we killed the once great river turtles off. And as humans destroyed the wetlands, largely for rice paddies, they routed the turtles even further. Survivors probably succumbed to hunters.

We take a boat onto the lake, heading toward a large island. The chances of actually seeing this turtle god are slim, I'm told repeatedly, but everyone on the boat still keeps a keen eye out.

The Yangtze giant softshell turtle is undeniably a strange-looking god: its long flat carapace and squishy body make it look, at times, like rolled-out, forest-green dough, the biggest weighing a stunning 150 to 220 kg (330 to 485 lb). It has a long neck, capable of periscoping like an otter, a mottled snout, goggly eyes, and a pig nose — its countenance not unlike an alien out of Star Wars.

But its oddity and rarity is what brought me here. The species is number 20 on the Zoological Society of London's EDGE list of reptiles, which ranks species based on a combination of their genetic distinctiveness and how imperiled they are. The Yangtze giant softshell turtle has one living close relative: the Euphrates softshell turtle (*Rafetus euphraticus*), which is currently listed as endangered by the IUCN and clocks in at 59 on the EDGE list.

After a short ride, we reach the island and meet Nguyen Van Trong, known by the nickname of "Chop." In his sixties and a former fisherman, Chop is now a full-time turtle watcher. Before the Red River was dammed, this island was actually his home; it was the site of the original village. When the dam was built, villagers were forced to move to a new spot on the edge of the reservoir.

Chop tells me via a translator that he remembers many turtles in the area when he was very young. Now, there is likely just the one here, but Chop knows this individual very well. One could say he's become attached.

"If he goes to work and he doesn't see it that day, sometimes he feel a bit sad — which turns out to be many days," the translator tells me.

On average, Chop sees the turtle about two to three times a month. If the villagers don't see it for a few months, McCormack says, "they start to worry."

With the presence of conservationists here, the villagers have come to see the animal as one of their own.

"All the people in the village and all the fishermen now know this *Rafetus* species in here [and] very rare. They want to keep it for long time for all students in the village can see it in the future," Chop says via the translator. "They maintain it for, yes, future generations."

To this end, sections of the lake have become no-fishing zones. Meanwhile, the team tells me that whenever any of the village's more than 50 fishermen see the turtle, they call Chop.

We head up the island and visit a recently constructed bamboo hut for Chop's convenience, so he has a shelter to sit in while watching for the turtle of Dong Mo to make its appearances. It doesn't during our short visit, but that's to be expected of this shy god.

Xuan Khanh Lake

About 20 kilometers (12 miles) northwest of Dong Mo sits another lake: Xuan Khanh, smaller and less picturesque than Dong Mo, but, as of 2018, the known home to another Yangtze giant softshell turtle.

Here, the ATP used a different strategy to find the turtle: after reports and photos of the animals proved inconclusive, they turned to environmental DNA, or eDNA. Taking samples of the water, they were able to finally prove a Yangtze giant softshell turtle lives here.

But eDNA has its limits in the search for more turtles: McCormack says the technology is not the "silver bullet" they'd hoped. They've discovered that eDNA may give many, many potential false negatives, likely due to trying to get the DNA of a single animal from a large body of water. In other words, it turns out getting DNA for the Yangtze giant softshell turtle is like finding a needle in a haystack or, you know, a single turtle in a massive body of water.

This means that although the team has deployed eDNA in other water bodies — and only gotten negatives — they still can't rule out other turtles.

Instead of going out on a boat, we talk a short walk, in the heat of the afternoon, around a small portion of Xuan Khanh, within sight of where the turtle mostly resides. As in Dong Mo, no turtle god appears, but according to DNA, at least, it's there, just below the surface.

But with only three animals, can anything be done? Yes, says McCormack. There are two next steps: one is to figure out the sex of the two turtles in the lakes. The other is to ramp up the search for more individuals.

The confirmation of one female could make all the difference. If this happens, big decisions would have to be made: whether breeding should be attempted in the wild or in captivity.

"I think each has pros and cons," McCormack says.

Currently, he says, the most likely plan would be to attempt breeding in a captive situation but on site.

This would allow conservationists and veterinarians the ability to closely monitor the process, but keep the animals out of the public eye (unlike, say, at a zoo) and allow the staff to use local water from the lakes. If other turtles are found, they could be brought to the same site. To date, there is no facility built for this, but McCormack says a number of sites are being considered, including the island on Dong Mo.

The Turtle God, Kim Qui, and the Restored Sword, Hoan Kiem
A depiction of the legend of the Kim Qui and the Restored Sword on a mural rendered in ceramics found in the Hoan Kiem temple located in Hanoi, Vietnam.
Photo © 2008 by Rdavout

Along with the ATP, the current proposal involves numerous conservation groups, including the Wildlife Conservation Society, Global Wildlife Conservation, Turtle Survival Alliance, Indo-Myanmar Conservation, the Hanoi University of Science, and, of course, Vietnamese officials.

But McCormack says what's needed most is funding.

"It's amazing — the species is so rare but if you look at funding and resources available it's quite limited. If you look at tiger conservation or elephant, you're talking about millions of dollars being put into it. For these species, there's very little in comparison."

Most of the money currently comes from grants and zoos, especially Cleveland Metroparks Zoo in the U.S.

But to build a facility, McCormack says, "we need a lot more funding."

The hunter

Le Huy Hoanh, the former turtle hunter, lives in a comfortable rural setting in a village not far from the lakes we visit. The proud father of 10 grown children, he makes us tea and tells us about the old days, when Yangtze giant softshell turtles were still abundant and adventure was high.

Hoanh, growing up in the 1930s, learned how to hunt the turtles from his father and grandfather. When he was around 12, hunters went out in groups of four on small boats and used a spear or harpoon to try and kill the animals, almost like a miniature version of the whalers of old. But increasingly, hooks and lines were used as an easier, less perilous option. The hunting appears to have been largely a village sport, with many men taking part, but the special hunters were those skilled in spearing.

Over a hunting career that spanned around six decades, Hoanh says he caught six large turtles in Suoi Hai Lake and 17 in the Dam Long wetlands. Many smaller animals may have been caught too. In the 1940s, Hoanh says, the Red River broke its banks, sending many Yangtze giant softshell turtles into Dong Mo Lake, where they were for a short time as common as "chickens in the garden." Nearly all of these animals were caught as food for the village, often eaten with rice wine.

"The softshell turtles didn't sell for anything different in the market. They were just butchered and consumed locally, most of them," McCormack says. "It's only recently when they became rare [that] there's more demand for them."

Now demand for Chinese traditional medicine means that turtle bones can be worth a small windfall. Hoanh tells us that poachers sold the bones of one turtle for 45 million Vietnamese dong — nearly $2,000.

"This is when people started realizing they were rare," McCormack adds.

However, the massive animals are not easy to catch. Not only can old turtles weigh more than two men combined — a single bite from their beaked mouth can rip a person's flesh clean off. Hoanh describes them as "very fast," telling us how during one escapade a turtle managed to capsize the boat of hunters and escape.

I ask Hoanh, via the translator, what the giant tastes like? He responds with, "It tastes just like soft-shelled turtle."

As I listen, I think about how Hoanh's stories resemble those of mythic dragon hunters or 19th-century whalers: a kind of struggle of man versus beast, a sprinkle of legend. But in this case, the beast in question is already heading toward possible extinction.

After our interview, Hoanh shows us the long spears used to kill the giant turtles, and the nets, deployed with hundreds of sharp curved hooks, deployed to entrap them.

Hoang caught his last turtle in the 1990s and sold it to a tourism company. No one knows what happened to it. Hoang says he kept attempting hunts for another few years, but most of the animals were gone by then. He estimates the last animal he tried to hunt weighed 400 kg (880 lb) — almost twice the size of any known Yang-

tze softshell turtle. It got away. Perhaps it was the final giant of his career. Or a myth, as good as a god.

Vietnam has changed much since Hoang was a child. He was born under French rule; Japanese occupation came next. There was the rise of Ho Chi Minh, the fall of France, and the Vietnam War (when Hoang was in his forties), or as they call it here, the American War. Finally, reunification and independence. And now the giants he once hunted are nearly a thing of the past, more myth than reality.

But the story of the turtle god, Kim Qui, doesn't have to end here. It's possible — with the proper resources, maybe even likely — that conservationists may find a pair capable of breeding. Just one nest would give the species a chance. A few healthy animals could lead to a population in the hundreds in just a few years.

Perhaps one day, the animal could even be brought home to its "Lake of the Returned Sword" in Hanoi.

A myth reforged. A god resurrected.

Galápagos Conservancy News — press release

Forty-Year Captive Breeding Program for Española Tortoises Concludes

10 January 2020—Ecuador's Environmental Ministry has decided to end the 40-year captive breeding program for Española tortoises following an ecological evaluation of Española Island, conducted by the Galápagos National Park Directorate (GNPD) and Galápagos Conservancy as part of the Giant Tortoise Restoration Initiative (GTRI). The evaluation demonstrated the recovery of habitat conditions and of the tortoise population that it hosts, thanks to the captive breeding program of the *Chelonoidis hoodensis* species; the breeding program was thus deemed to have met the restoration objectives for which it was created.

Diego, an Española Island Giant Tortoise (*Chelonoidis hoodensis*) at the Charles Darwin Research Station in Santa Cruz, Galapagos. Some 40% of the tortoises repatriated to Espanõla Island are likely descendants of Diego. **Photo © 2019 by Kaldari**

"Based on the results of the last census conducted at the end of 2019 and all the data available since 1960 — both of the island and its tortoise population — we developed mathematical models with different possible scenarios for the next hundred years. The conclusion was that the island has sufficient conditions to maintain the tortoise population, which will continue to grow normally — even without any new repatriation of juveniles," said Washington Tapia, director of the GTRI.

"In addition to the recovery of the giant tortoise population, which went from 15 to 2,000 thanks to this program, the management actions implemented for the ecological restoration of the island — including the eradication of introduced species and the regeneration of cacti through Galápagos Verde 2050 project — have helped to ensure that the island's ecosystems currently have adequate conditions to support the growing population of tortoises," added the Director of the Galápagos National Park, Jorge Carrión.

The closure of the Española tortoise captive breeding program will entail the return of the 15 unique breeding adults (12 females and 3 males) originally found on the island, which have allowed the repatriation of tortoises to their natural habitat since the program's inception in the mid-1960s. This week, these breeding individuals began a quarantine process to eliminate risks of seed dispersal from plants that are not typical of the island. The plan is to release them back to Española, their island of origin, in March 2020.

This group of tortoises includes the famous Diego, the male who spent 30 years at the San Diego Zoo before being recruited to contribute to the captive breeding program. Diego, who is over 100 years old, will return to his home island almost eight decades after being extracted from it. In recent years, Diego has become a symbol of the Galápagos conservation, as approximately 40% of the tortoises repatriated to Española Island are estimated to be his descendants.

Diego at the Charles Darwin Research Station. **Photo © 2019 by Kaldari**

Orlando, along with the global scientific community, mourns the loss of world-renowned turtle conservationist Dr. Peter Pritchard

Orlando, Florida.— 26 February 2020 — Orlando resident and world-renowned turtle and tortoise conservationist Dr. Peter C.H. Pritchard died yesterday evening. His life was marked by a 50-year legacy of global conservation.

Dr. Peter Charles Howard Pritchard (1943–2020). Photographer credit is currently unavailable.

Dr. Pritchard was best known as an authority on the biology and conservation of turtles and tortoises. Founder of the Chelonian Research Institute (CRI) in Oviedo, Florida, his work took him to more than 100 countries where he conducted extensive field work with turtles on all continents and many remote islands. He established a permanent field station for turtle conservation in northwestern Guyana. Four species of turtle are named after him – a snakeneck turtle from New Guinea, a pond turtle from northern Burma, a giant fossil sideneck turtle from Colombia and an adult male green turtle from the Carr Refuge in Florida. He was recognized as a "Champion of the Wild" by the Discovery Channel and as "Hero of the Planet" by TIME Magazine. He was also declared "Floridian of the Year" by the Orlando Sentinel and "Hometown Hero" by the Orlando International Airport.

Dr. Pritchard was a recipient of the Turtle Conservancy's Conservation Achievement Award; a Southeast Regional Sea Turtle Hall of Fame inductee; and a recipient of the Sea Turtle Society's Kemp's Ridley Research Award for his extensive research on this endangered species of sea turtles, considered the smallest sea turtle species in the world. His industry distinction of having dual expertise in sea turtles and tortoises and freshwater turtles resulted in being the only industry figure to be awarded both the prestigious John Behler Award for turtle conservation and the Lifetime Achievement Award from the International Sea Turtle Society. In 2017, he was presented the Archie F. Carr medal from the Florida Museum of Natural History at the University of Florida. He was fluent in Spanish and French and is published in both of those languages. He authored 14 books, most notably "The Encyclopedia of Turtles."

"Peter Pritchard and I were within 6 days of sharing the same birthday. More importantly, we shared a passion for all manner of turtles including sea turtles, terrapins and tortoises," said Chelonian Research Institute Board Chairman and longtime friend Rob Truland. "Peter was the scholar, the explorer, the collector and author whereas my role was to support his endeavors. Through the Chelonian Research Institute and the loyal support of their generous board, Peter's influence and projects stretched globally. As of last year, he and I had known each other for 40 years. If you are lucky enough to have known one great man in your lifetime, you are lucky enough."

Dr. Pritchard developed the concept of *conservation without confrontation,* finding common ground with local communities and governments through mutual education to establish lasting environmental changes. He applied these techniques both in Florida and around the world and was invited by the governments of nations ranging from Trinidad and Tobago to Papua, New Guinea to develop socially sensitive programs for wildlife conservation. In Mexico in the 1980s, he engaged in a series of dialogues with the proprietor and owner of a major marine turtle slaughterhouse and international industry in turtle products who was identified by many as being beyond the conservation ethic. These exchanges resulted in the individual leaving the industry and ultimately to the closure of the operation.

He is credited with the rescue of Kemp's Ridley species of turtles in Mexico, resulting in a 20-year increase of the species' population. He created the first nesting beach patrol effort, which later was adopted and expanded by the Mexican government and US conservation agencies.

Dr. Pritchard also worked with the Arawak people of Guyana for many years, instilling a more protective attitude toward the wildlife species, especially marine turtles, upon which they depend.

This project attracted international attention and was described in the National Geographic book Hidden Worlds of Wildlife. It was also featured in a special for the Paris television network Canal Plus (shown widely in Europe). The Guyana conservation program resulted in Dr. Pritchard being selected as a featured conservationist for the Canadian television series Champions of the Wild, shot on-site in Guyana, and aired extensively in Canada, the UA, and the UK. As a continued credit to his influence in Guyana, Dr. Pritchard obtained the support of then Prime Minister, the Honorable Sam Hinds, in the conservation effort and established an on-going partnership with the Arawak community for conservation education. Both he and the prime minister became patrons of the Sea Turtle Protection Society in Guyana. This project is one of the longest-standing sustainable conservation programs in the world. He became a board member and co-patron with the prime minister and other influential professionals of the Guyana Marine Turtle Conservation Society. He also maintained projects in Vietnam and China, focused on conservation of the world's largest and rarest softshell turtle.

He is best known for his work in the Galapagos Islands and was featured extensively in a BBC4 television production about the area and its giant male Pinta Island Tortoise, Lonesome George, the last known individual of the subspecies, noted as the rarest creature in the world. Dr. Pritchard was among the first scholars to discover the tortoise; was the only industry professional with rare video footage of it in its habitat; and as a member of the research team, facilitated its discovery in the Galapagos Islands.

CRI's collection of turtle and tortoise specimens contains 14,500 specimens, the most comprehensive in existence, with 100% of genera and about 95% of living species being represented. The Institute operates without sacrifice of live animals. He resided in Oviedo, Florida, in the Orlando area, and is survived by his wife Sibille Hart Pritchard, two adult sons, Sebastian and Cameron, and was preceded in death by son Dominic.

"For 50 years, Peter has been my partner, my strength and my soulmate," said his wife Sibille Hart Pritchard. "The influence he's had on colleagues, students and friends is a testament to his brilliance as a scientist and his kindness as a man. The lives he touched and the difference he made in the world of environmental conservation made our home here in Florida a global gathering place where people from all over the world became part of our lives. Together, we've had an amazing journey, raised three incredible men and shared experiences of a lifetime."

Dr. Pritchard photographed by a US Geological Survey staffer. Public domain.

He established and immense legacy and leaves family, friends, a global community of scientists, researchers and turtle enthusiasts to honor the indelible impression he's made on the world through his life's work.

A date will soon be announced for a tribute celebration.

— Archie Carr Center for Sea Turtle Research press release

Three turtle species are named in honor of Dr. Pritchard:

Chelodina pritchardi, a snakeneck turtle from New Guinea;

Mauremys pritchardi, a pond turtle from northern Burma,

Podocnemis pritchardi, a giant fossil sideneck turtle from Colombia.

An adult male green turtle, *Chelonia mydas*, from the Carr Refuge in Florida is also named after Dr. Pritchard.

§ § §

Dr. Pritchard is the author, coauthor, and translator of various books and publications, including:

Living Turtles of the World (1967)

Marine Turtles of Micronesia (1977)

The Encyclopedia of Turtles (1979)

Leatherback or Leathery Turtle (Dermochelys Coriacea) (1980)

Rare and Endangered Biota of Florida Volume One Through Six (1982)

Manual of Sea Turtle Research and Conservation Techniques (1983)

Turtles of Venezuela (1984), with coauthor Pedro Trebbeau

Saving what's left: A citizens' guide to the need, process, and politics of environmental land acquisition in Florida (1994)

The Alligator Snapping Turtle: Biology and Conservation (2006)

Turtles of the World written in French by Franck Bonin, Bernard Devaux, and Alain Dupré; translated into English by Peter C. H. Pritchard (2006)

Tales from the Thébaïde (2007)

Rafetus, the Curve of Extinction (2012)

To learn more about Dr. Pritchard, please visit the Chelonian Research Institute's web page entitled **About Dr. Peter Pritchard**

Mike's Turtle Net Picks by Michael J. Connor, Ph.D.

A varied selection of recent articles, stories and sites on the Web that some of you may find as interesting as I did. This list is also posted at tortoise.org/turtlenetpicks/turtlenetpicks.html

Peter Pritchard, RIP
Peter Pritchard, turtle conservationist extraordinaire, passed away February 25, 2020.

Over 18,000 Commenters Oppose Building Highway Through Red Cliffs Reserve
Over 18,000 commented on Northern Corridor highway in defense of Red Cliffs Reserve. This proposed highway would go through the most important desert tortoise habitat on the preserve.

Desert Tortoise Genome
New draft desert tortoise genome assembly is yielding interesting results.

Genotyping Protocol for Mojave Desert Tortoise Scat
Biologists have developed a genotyping protocol that can identify individual tortoises from their poop!

Galapagos Status
If you are curious about current conditions in the Galapagos, a new website lets you check climatic conditions and volcanic activity across the archipelago.

Descendants of Two "Extinct" Galapagos Tortoises Found
After a 10 day search, biologists have recovered tortoises with Floreana and Pinta Island genetic backgrounds from Isabela Island's Wolf Volcano - descendants of tortoises left there by whalers.

Diego the Giant Tortoise to be Released Back to the Wild
After participating in a breeding program for almost eight decades, Diego, a 100-year-old Galapagos tortoise, will be released back on his native Española (Hood) Island in March.

Largest Ever Fossil Turtle
At 2.40 meters (7.5 feet) long, a reconstructed fossil *Stupendemys geographicus* from Venezuela is the largest turtle ever found.
The published paper is open access.
https://advances.sciencemag.org/content/advances/6/7/eaay4593.full.pdf

Important New Fossil Turtle From France
Laurasichersis relicta, a newly discovered key stem turtle, survived the asteroid impact that caused the Cretaceous-Paleogene mass extinction and killed off the dinosaurs.
The published paper is open access.
https://www.nature.com/articles/s41598-020-58511-8

Yoshi, Long Distance Swimmer
A loggerhead sea turtle from Australia has officially left all other long-distance swimmers in her wake after swimming 22,000 miles in two years!

Oil Spills and Sea Turtles
New study documents the effects of oil spills on sea turtles, and provides recommendations related to oil spills for managers, researchers, and conservation groups around the world.

Sea Turtle Successes
Five sea turtle conservation success stories of the 2010's.

African Sea Turtle News
Read the latest African Sea Turtle Newsletter.

CTTC's Turtle And Tortoise Listserve
CTTC's Turtle and Tortoise list has now moved to io.groups. If you want to talk with other turtle and tortoise fans in a friendly atmosphere just send an email to: <CTTC-TurtleAndTortoise-list+subscribe@groups.io>

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Meetings and Programs

Click on your Chapter's website link for the latest program information. Programs may be scheduled after newsletter publication.

Chino Valley
20 March; 17 April

Foothill
27 March; 24 April — Annual Plant Auction

High Desert
9 March; 13 April

Inland Empire
6 March; 3 April

Kern County
9 March; 13 April

Low Desert
6 April

Orange County
13 March; 10 April

Ridgecrest
9 March; 13 April

Santa Barbara-Ventura
Contact the chapter for meeting information.

Santa Clarita
21 March

TOOSLO (San Luis Obispo)
17 March; 21 April

TTCS (Long Beach)
21 March; 18 April

Valley
20 March; 17 April

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www.zoomed.com

Rare turtles saved from shrinking waterholes — Wildlife experts are moving rare Manning River turtles from rapidly drying waterholes to help save the ancient species.

New South Wales, Australia — 3 February 2020 — Department of Planning, Industry and Environment (DPIE) spokesperson, Kylie Yeend, said she was pleased expert teams have begun moving these precious animals to larger waterholes to help them get through the drought.

"The Barnard River is one of the waterways in the Manning River Valley which is home to these rare turtles that have been around for 50 million years," Ms Yeend said.

"The Barnard River is now largely dried up with only a series of small, shrinking waterholes left for the Manning River turtles and other aquatic wildlife.

"Our experts are taking urgent action, working with Aussie Ark to monitor and relocate turtles from small waterholes into larger ones until rainfall replenishes the waterways."

Director of Aussie Ark Tim Faulkner said they have established a world-first 'insurance population' for the Manning River turtle, where three turtles rescued from the waterholes have been taken into care for conservation and breeding.

"The 3 collected turtles are the first founders of the insurance population. By March this year, 12 turtles will be collected from across its range, for genetic reasons, to complete the insurance population," Mr Faulkner said.

Ms Yeend said we are now in a position to intervene and protect Manning River turtles from extinction.

"We can all do our bit in these unprecedented situations by going down to rivers and waterholes affected by drought to check for sick or dying turtles," Ms Yeend said.

The public should not take animals out of the environment but report anything significant to the Enviroline on 131 555.

— *New South Wales government press release*

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CTTC Mailing Addresses

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Foothill Chapter: P. O. Box 51002, Pasadena, CA 91115-1002

High Desert Chapter: P. O. Box 163, Victorville, CA 92393

Inland Empire Chapter: P.O. Box 2371, San Bernardino, CA 92406-2371

Kern County Chapter: P.O. Box 81772, Bakersfield, CA 93380-1772

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Ridgecrest Chapter: P. O. Box 1272, Ridgecrest, CA 93555

Santa Barbara-Ventura Chapter: P.O. Box 3086, Camarillo, CA 93011-3086

Santa Clarita Chapter: P.O. Box 4012, Castaic, CA 91310

TOOSLO Chapter: P.O. Box 763, Grover Beach, CA 93483

Turtle & Tortoise Care Society Chapter: P O Box 15953, Long Beach, CA 90815

Valley Chapter: P.O. Box 7364, Van Nuys, CA 91409-7364

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