

All but Ageless, Turtles Face Their Biggest Threat: Humans

Next Article in Science (1 of 12) »



Imke Lass for The New York Times, at the University of Georgia, Savannah River Ecology Lab

An alligator snapping turtle, found in the southeastern United States only in rivers that flow into the Gulf of Mexico.

By NATALIE ANGIER
Published: December 12, 2006

This was no euphemistic brushoff, no reptilian version of “Sorry, I’ll be busy that night washing my hair.” Paddling around in a tropically appointed pool at the National Aquarium in Baltimore, the husky female Gibba turtle from South America made all too palpable her disdain for the petite male Gibba that pursued her. He crawled onto the parqueted hump of her bark-brown shell. She shrugged and wriggled until he slipped off. He looped around to show her his best courtship maneuvers, bobbing his head, quivering his neck. She kicked him aside like a clot of algae and kept swimming.

- [E-MAIL](#)
- [PRINT](#)
- [REPRINTS](#)
- [SAVE](#)
- [SHARE](#)

ARTICLE TOOLS
SPONSORED BY

“I feel sorry for the little guy,” said Jack Cover, a turtle specialist and the general curator of the aquarium. “He’s making no progress, she’s got zero interest in him, yet he just keeps coming back for more.”

And why not? The male Gibba may be clueless, he may at the moment have the sex appeal of a floating toupee, but he is a turtle, and, as a major new book and a wealth of recent discoveries make abundantly clear, turtles are built for hard times. Through famine, flood, heat wave, ice age, a predator’s inspections, a paramour’s rejections, turtles take adversity in stride, usually by striding as little as possible.

“The tale of the tortoise and the hare is the turtle’s life

Ask Science

Natalie Angier will answer select reader questions regarding this article. E-mail your questions to askscience@nytimes.com. E-mails may be published. Answers will be posted on nytimes.com/science on Friday.

[More Ask Science »](#)

Multimedia

MOST POPULAR

1. All but Ageless, Turtles Face Their Biggest Threat: Humans
2. In Tuition Game, Popularity Rises With
3. Yes, You Can Surf in Cleveland, Before Water Freezes
4. Study Detects Recent Instance of Human
5. Holocaust Deniers and Skeptics Gather
6. Architecture Review | Yale University Art Gallery: Restoring Kahn’s Gallery, and the Corner of Architectural History, at Yale
7. So This Manatee Walks Into the Intern



Video

Extinction Looming?

Related

Though Sturdy Survivors, Turtles Prove to Be Ill Equipped for Human Threat (December 12, 2006)



Imke Lass for The New York Times, at the University of Georgia, Savannah River Ecology Lab

From top, a leopard tortoise, a South African land-based species and a common pet. Center, a New Guinea snakeskin turtle, a carnivorous species found in the river system in the southern part of the country. Above, a big-headed turtle, native to mountain streams in Southern China and related to North American snapping turtles.

story,” said Mr. Cover, who calls himself a card-carrying member of the “turtle nerds” club. “Slow and steady wins the race.”

With its miserly metabolism and tranquil temperament, its capacity to forgo food and drink for months at a time, its redwood burl of a body shield, so well engineered it can withstand the impact of a stampeding wildebeest, the turtle is one of the longest-lived creatures Earth has known. Individual turtles can survive for centuries, bearing silent witness to epic swaths of human swagger. Last March, a giant tortoise named Adwaita said to be as old as 250 years died in a Calcutta zoo, having been taken to India by British sailors, records suggest, during the reign of King George II. In June, newspapers around the world noted the passing of Harriet, a Galapagos tortoise that died in the Australia Zoo at age 176 — 171 years after Charles Darwin is said, perhaps apocryphally, to have plucked her from her equatorial home.

Behind such biblical longevity is the turtle’s stubborn refusal to senesce — to grow old. Don’t be fooled by the wrinkles, the halting gait and the rheumy gaze. Researchers lately have been astonished to discover that in contrast to nearly every other animal studied, a turtle’s organs do not gradually break down or become less efficient over time.

Dr. Christopher J. Raxworthy, the associate curator of herpetology at the [American Museum of Natural History](#), says the liver, lungs and kidneys of a centenarian turtle are virtually indistinguishable from those of its teenage counterpart, a Ponce de Leon quality that has inspired investigators to begin examining the turtle [genome](#) for novel longevity genes.

“Turtles don’t really die of old age,” Dr. Raxworthy said. In fact, if turtles didn’t get eaten, crushed by an automobile or fall prey to a disease, he said, they might just live indefinitely.

Turtles have the power to almost stop the ticking of their personal clock. “Their heart isn’t necessarily stimulated by nerves, and it doesn’t need to beat constantly,” said Dr. George Zug, curator of herpetology at the [Smithsonian Institution](#). “They can turn it on and off essentially at will.”

8. Well Done!: Talking the Yanks Under the
9. Gay and Evangelical, Seeking Paths of A
10. Is Marathonng Too Much of a Good Thi Heart?

[Go to Complete List »](#)



Business
nytimes.com/business

[What new technology has brought low cost, f marketing campaigns to Times Square?](#)

Also in Business:

- ➔ [High-definition TV is great, but just how many watch it?](#)
- ➔ [The auto industry's new commitment to the er](#)
- ➔ [Craigslist meets the capitalists](#)

ADVERTISEMENTS

Switch to TD AMERITRADE and trade free for 45 days + get \$100.

Yahoo! Food:
Add a dash of Yahoo! and spice up your next meal.

The New York Times STORE



WHEN THE WALL CAME DOWN
Buy Now

INSIDE NYTIMES.COM

[Enlarge This Image](#)



Stan Fallows

Turtles resist growing old, and they resist growing up. Dr. Zug and his co-workers recently determined that among some populations of sea turtles, females do not reach sexual maturity until they are in their 40s or 50s, which Dr. Zug proposes could be “a record in the animal kingdom.”

Turtles are also ancient as a family. The noble chelonian lineage that includes all living turtles and tortoises extends back 230 million years or more, possibly predating other reptiles like snakes and crocodiles, as well as birds, mammals, even the dinosaurs.

The turtle’s core morphology has changed little over time, and today’s 250 or so living species all display an unmistakable resemblance to the earliest turtle fossils. Yet the clan has evolved a dazzling array of variations on its blockbuster theme, allowing it to colonize every continent save Antarctica and nearly every type of biome nested therein: deserts; rainforests; oceans; rivers; bogs; mountains; New Brunswick, Canada; New Brunswick, N.J.

“Turtles can persist in habitats where little else can survive,” said Dr. J. Whitfield Gibbons, a professor of ecology at the [University of Georgia](#) in Athens.

Troubles Foreseen

The iconic turtle likewise has colonized the human heart. People may despise cats or fear dogs, but practically everybody has a soft spot for turtles. “Turtles are by far the most popular reptile,” said Peter C. H. Pritchard, director of the Chelonian Research Institute in Oviedo, Fla. “Unlike snakes, which may threaten you and which move like a flash, turtles are benign and slow, and you can’t dislike or distrust the clumsy.”

Yet such warm and fuzzy feelings have proved cold comfort for turtles, and herpetologists fear that in humans the stalwart survivors from the Mesozoic era may at last have met their mortician. Turtle habitats are fast disappearing, or are being fragmented and transected by roads on which millions of turtles are crushed each year. “There’s no defense against that predator known as the automobile,” Dr. Gibbons said.

Researchers estimate that at least half of all turtle species are in serious trouble, and that some of them, like the Galapagos tortoise, the North American bog turtle, the Pacific leatherback sea turtle and more than a dozen species in China and Southeast Asia, may effectively go extinct in the next decade if extreme measures are not taken. “People love turtles, people find them endearing, but people take turtles for granted,” Mr. Cover said. “They have no idea how important turtles are to the ecosystems in which they, and we, live.”

Researchers are also impressed by the turtle’s many sensory talents. Box turtles and other forest-dwelling species can spot a lake or pond a mile in the distance, possibly by detecting polarized light glinting off the surface of the water. Female sea turtles migrate across

entire oceans every breeding season, unerringly making their way from far-flung feeding grounds right back to the beach where they were born, and where they are instinctively driven to lay their own eggs.

Instinctive does not mean inflexible, however. Should a weary wayfarer arrive at her natal beach in the dead of night and find it has eroded away, Dr. Pritchard said, she can adapt, swimming down the coast until she locates a suitably sandy nesting site.

Turtles, it seems, are all ears, all the time. Dr. Ray Ashton, who runs the Finca de la Tortuga biological preserve in Archer, Fla., has highly preliminary evidence that some turtle species may communicate subsonically, just as elephants do, transmitting and detecting ultralow frequency sound waves as vibrations in the ground.

In their new book, "Turtles of the World" (Johns Hopkins Press), Franck Bonin, Bernard Devaux and Alain Dupré seek to loft turtles into the limelight by showcasing the group's diversity — its beauties, its goofies, its gargoyles.

There is the Indian star tortoise, its shell a vivid basket weave of dark and light veins that dance like spattered sunlight as the tortoise crosses the forest floor; and the Matamata turtle of the Amazon basin, with a flattened, ragged head and neck that look like dead leaves and a bumpy shell that mimics an old log — just try to spot that Matamata at the bottom of a stream, awaiting passing prey; and the massive alligator snapping turtle of the south-central United States, which lures fish right into its open jaw with a red bleb of flesh on the floor of its mouth that jiggles like a chubby worm.

Some turtles have serpentine necks twice the length of their shells; others sport sweet little snorkeling snouts that look like double-barreled cocktail straws; still others have beaks so fiercely hooked their bearers could easily serve, in the authors' words, as "adornment of the upper reaches of Notre Dame."

Among the most common questions leveled at turtle researchers is, What is the difference between a turtle and a tortoise? It depends on where you live, researchers reply. In the United States, any reptile with a shell is referred to as a turtle, and the term tortoise is reserved for those turtle species that have elephantine feet and live entirely on land, like the desert tortoise of the American Southwest. In Australia, by contrast, the word tortoise often applies to aquatic side-necked species — bizarre beasts with necks that cannot be drawn into the shell for protection but instead must be tucked on the side, under the shell's eavelike overhang.

Whatever their group identity badge, turtles vary considerably in size, from the tiny speckled padloper tortoise of South Africa, which in adulthood is no bigger than a computer mouse, to the great leatherback sea turtle, which can measure seven feet long and weigh 2,000 pounds.

Menu plans vary as well. Many turtles are omnivores, happily consuming fruits, leaves, insects, mollusks, fish, frogs, ice cream. Dr. Gibbons told of a friend whose pet box turtle would respond to the sound of a spoon being tapped on a glass ice cream bowl by emerging from behind the couch, walking over to its owner, rearing up on its hind legs and

waiting to be spoon-fed its just dessert. “Had I not seen this a few times myself,” he said, “I would not have believed it.”

A few turtles have highly specialized palates. Green sea turtles prize the tender tips of sea grass, and will clip away and discard tough, older grass to stimulate the sprouting of fresh buds beneath. Leatherback sea turtles dine only on jellyfish, or what they think are jellyfish. “Plastic bags look like jellyfish,” said Dr. Joseph Mitchell, an ecologist and turtle specialist in Richmond, Va., “and quite a few leatherbacks have stomachs impacted with plastic bags.”

Some turtles, conversely, seek out the world’s detritus. Scavenger turtles that live in the Ganges River devour human corpses, making it possible for devout Hindus to deposit their loved ones’ remains in the waters they deem sacred.

An Iconic Feature

Whether they wrest it from sea grass, shellfish or Häagen-Dazs, all turtles need a substantial amount of calcium in their [diet](#), to sustain the structure that marks them as turtles and that remains among the most extraordinary architectural achievements in vertebrate evolution: the shell. A number of invertebrates have shells, of course, and so, too, do a few vertebrates, most notably the armadillo. But whereas the armadillo’s shell is built of bony segments slapped down over its muscle tissue and is distinct from the mammal’s underlying skeletal frame, in the turtle the skeleton has become the shell.

During embryonic development, the bones of the turtle’s rib cage grow straight out, rather than curving toward one another as they do in other vertebrates. Those ribs, spinal vertebrae and other skeletal bones are then fused to form the upper shell, called the carapace, the lower shell, or plastron, and the bony bridges that join upstairs with down. In many turtle species, the bony shell is in turn plated over with tough fingernail-like structures called scutes.

As a result of the osteotic overhaul, not only can a turtle not crawl out of its shell, it has trouble crawling, period. “Its legs stick out at bizarre angles, and the only reason it can walk at all is through sheer strength,” Dr. Pritchard said. “The turtle has enormously strong muscles and extremely thick leg bones.” A clumsy gait proved a small price to pay, however, for the acquisition of body armor that protects adult turtles against a panoply of jaws and claws.

Geneticists have proposed that the turtle shell may have appeared quite suddenly in the distant past, rather than emerging slowly through modest, mincing modifications of pre-existing structures. They suggest that the dramatic innovation could have arisen from just a few key mutations in master genes like the so-called homeobox genes, which help specify an animal’s basic body plan. If the shell did burst on the reptilian stage more or less fully formed, they said, that would explain the lack of “intermediary” fossils or prototurtles in the paleontological record.

The shell very likely helps explain the turtle’s elongated storyline. It takes time to consolidate a large, thick shell, but upon reaching adult stature, the turtle is close to

invulnerable. At that point, it can compensate for its Darwinically unproductive youth with a very prolonged and zealously fecund adulthood. A female turtle will continue laying eggs until she dies, and a male turtle will just as mulishly pursue her.

[Next Article in Science \(1 of 12\) »](#)

Need to know more? 50% off home delivery of The Times.

Ads by Google what's this?

Personal Air Purifier
Buffer From Smoke, Virus, Bacteria Smallest Most Powerful On Market!
www.plasmapurifier.com

Great Oceania Cruise Deal
2 for 1 Cruise Fare + Free Air + Prepaid Gratuities + \$150 To Spend
CruiseExperts.com

Hawaiian Airlines
Fly to Kaua'i on the #1 Carrier Serving Hawaii. Book Now & Save!
www.HawaiianAirlines.com

Tips

To find reference information about the words used in this article, hold down the ALT key and click on any word, phrase or name. A new window will open with a dictionary definition or encyclopedia entry.

Related Articles

- [In Kansas, a Line Is Drawn Around a Prairie Dog Town \(December 11, 2006\)](#)
- [The Primatologist \(November 26, 2006\)](#)
- [Tenerife Journal; In Nature's Immigration Fight, Newcomers Battle Natives \(August 29, 2006\)](#)
- [Sleek? Well, No. Complex? Yes, Indeed. \(August 29, 2006\)](#)

Related Searches

- [Animals](#)
- [Endangered and Extinct Species](#)

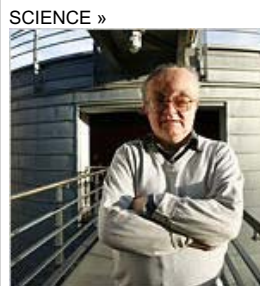


Rhoden: Selling a Quarterback Short

N.Y. / REGION »
Rap Lyrics Take Center Stage in Court



So This Manatee Walks Into the Internet



Cryptologist Deciphers DNA's Deep Secrets

TimesSelect
Happy Days
In a new blog, Richard Conniff explains why the absence of gossip would leave us bereft.



The Cost of Planet