The Croaker

Newsletter of the Tablelands Frog Club

Striped Marsh Frog

(Limnodynastes peronii)

April 2009

Tablelands Frog Club

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The Croaker is the Newsletter of the Tablelands Frog Club Incorporated. This Newsletter is produced by the voluntary efforts of members. We gratefully accept all contributions, however limited space may mean that contributions are not included immediately, and all are subject to editorial discretion. The TFC newsletter is published bimonthly (i.e. February, April, June, August, October, & December). Newsletter submissions are due on the 15th of the preceding month. Please direct all contributions to The Editor c/o Tablelands Frog Club, at the addresses listed above.

TFC meetings/nights and field trips/outings are held monthly. See schedule for dates, speakers and locations. Annual membership fees are:

$15.00 Adults
$15.00 Family
$ 5.00 Junior/Associate

The Croaker is now available as a PDF to members that have access to email. The PDF version of *The Croaker* is in full colour, and contains more information than mail-out photocopied versions. Email costs less to send out, and doesn't waste paper and other resources, making it good for the Tablelands Frog Club and the environment. To take advantage of this service, contact the Tablelands Frog Club with your email details. You will need Adobe Acrobat Reader to open PDF files. The latest version of Adobe Acrobat Reader is available as a free download from:

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WANTED

Articles, photos, observations, notes, drawings, and other frog related stuff for inclusion in the newsletter.

FROG CLUB FIELD TRIP TO TEPON WETLAND

On Saturday 28th March we held a field trip to the Tepon Wetland, near Wondecla. The purpose of the trip was to survey the frog fauna of the area. March was chosen for a field trip as it was assumed that this would still be during the wet season, but this year it appears that the wet season finished early. However there was still plenty of water there.

The habitat is seasonally inundated swampland in Blue Gum Forest comprising a total are of around 200 hectares. We investigated a small section opposite the Equestrian Grounds, with 13 people attending.

At first there appeared to be little activity, but as night fell we heard some calls from the Brown-striped Marsh Frog Limnodynastes peronii. As we walked in towards the water the first frog found was a tiny metamorphling sedgefrog Litoria fallax or bicolor. This proved to be the first of many of these tiny frogs, in the period of about 1 hour we sighted at least 100 of these, mostly perched on reeds and small leaves & branches both in and surrounding the swamp. Calls were also heard which sounded most similar to L. fallax but the calls were not able to be positively identified. No adults were located although about 3 were calling. The most commonly heard call was that of the Brown-striped Marsh Frog Limnodynastes peronii. One male frog was eventually located by triangulating the call and then detailed examination of a grass tussock. A metamorph of this species was also found. The third species found was the Laughing Tree Frog Litoria rothi. Three sub-adult specimens were found on the fallen branches or trunks of trees in the swamp.

Further survey of this area is scheduled for later in the year. The first heavy storms of the coming wet season should hopefully bring out considerably more species.
AUTHOR: Michael Anthony

From the president's lilypad

There have been no great successes or failures for the past year. In fact it has been much the same as last year.

Once again we have been blessed with a number of excellent guest speakers, enthralling us with their amazing photographs and brilliant narrations.

Martin Cohen (twice now this year), Kelvin Marshall, Jean Horton and Michael Cermak.

Also for a few years now we have also been privileged to have a fantastic newsletter, thanks to Darren Green and an outstanding website thanks to Claudine Grandjean.

I think I may have now exhausted my superlatives!

We have had some reasonably successful field trips, particularly Davies Creek and Mareeba Wetlands.

Our one effort at holding a public display, at the National Parks Centenary Celebration at Millstream, was disappointing in that only one person had to shoulder the full responsibility of organising and attending.

As a result any other plans for such events were shelved.

We have sold the bulk of our merchandise, the committee is looking towards organising some more in the near future but this will have to wait until any changes are made to the club.

Some of the merchandise was raffled off at meetings, resulting in some extra revenue for the club.

We have had a steady stream of new members, however it is once again disappointing that we also have had a fairly high turnover of members as well over the past few years – it is hoped that a change of name and expansion of scope for the club should bring in a large influx of new members.

The club remains in a healthy financial position, however this is not the point of an association such as ours, we should be looking towards using this money that we have to further the aims of the club. The main problem with this is finding the time to utilise our funds, and this is and has been a problem with the club over recent years, something we hope to rectify every year; hopefully this coming year will be the one.

Thanks to everyone for their support over the past 12 months and I hope all current members renew their memberships and anyone here tonight who is not a member will join up and participate in the advancement of the club.

Michael Anthony

http://www.tablelandfrogclub.com

Unless you have paid in the last 6 months your membership should be due – its only $15.00! Please send cheque, money order or cash to our mail address (Mail Bag 71 Yungaburra Qld 4871) or you can do a direct deposit to our bank account – BSB: 064 800 ACC: 10039238 Tablelands Frog Club Inc (please post or email us a copy of the transaction with your name on it and a membership form if your details have changed).

Wild News... IN THE SPOTLIGHT

Large Areas Of Conservation Land Needed To Save Small Frogs, Turtles And Other Marine Species

ScienceDaily (June 13, 2008) — Scientists were surprised with findings of a recent study that reveals many animal species believed to persist in small contained areas actually need broad, landscape level conservation to survive. With more species at risk of extinction today than any other time in human history, the findings of the study published in the debut issue of Conservation Letters provides new insight into how to improve protection for many species worldwide. Scientists from organizations including Conservation International (CI) and BirdLife International identified appropriate scales of conservation efforts for 4,239 species of mammals, birds, reptiles, and amphibians included on the IUCN Red List of Threatened Species.

"The biggest surprise was the frogs," said Claude Gascon, executive vice president for programs and science at CI, and co-chair of the IUCN Amphibian Specialist Group. "Amphibians are small animals, and many have tiny ranges restricted to a single forest or a mountain stream. But astonishingly many species – like the Critically Endangered Lake Titicaca Giant Frog (Telmatobius culeus) from Peru – are greatly impacted by ecological processes at the landscape scale."

Many freshwater species, such as frogs and other amphibians, are threatened by environmental changes to watersheds or river basins impacted by pollution, deforestation or dams. The study found that 20 percent of threatened amphibians, and no less than 40 percent of threatened freshwater turtles, depend on broad-scale conservation action to address changes in freshwater processes.

"It's not that these animals themselves need a huge area per se, but rather that comprehensive and successful strategies must include various scales of action from sites to landscapes," Gascon added. "But we have to think about how we impact the quality and flow of freshwater across entire landscapes. And remember that people need those flows of clean freshwater across landscapes in the same way that frogs do."

The establishment of protected areas to safeguard key biodiversity areas has been long considered the most effective means to protect threatened species. The study reinforces this assumption, showing that the protection of key sites must remain the foundation for all conservation efforts. However, it also showed that considerably more threatened species need urgent conservation action at the landscape or seascape level than previously believed. Fully one in five threatened vertebrates require urgent conservation action at the landscape or seascape scale, including such flagship species as the tiger (Panthera tigris) and the Philippine Eagle (Pithecophaga jefferyi).

The study also covered marine mammals, seabirds and sea turtles, and showed that 74 percent of these require urgent seascape level action. These include species like the Galápagos Fur Seal (Arctocephalus galapagoensis) and the Waved Albatross (Phoebastria irrorata), from the Eastern Tropical Pacific. "While the need for seascape conservation is overwhelming for these species," cautioned Charlotte Boyd, the study's lead author and now a marine ecologist at the University of Washington, "we urgently need equivalent assessments for fish to obtain a more comprehensive picture of what conservation actions are needed where in marine systems."

Overall, the study provides strong new evidence supporting the integration of multiple scales of conservation, including protected areas as well as landscape and seascape level conservation strategies.

"Our key conclusion is that both site-scale and broad-scale conservation are essential to prevent mass extinction," said Thomas Brooks, from the CI Center for Applied Biodiversity Science. "We recognize that site protection is the cornerstone for almost all threatened species. We are now also certain that a substantial proportion and unexpected diversity of threatened species will be lost without urgent conservation intervention at the sea or landscape level."

SOURCE: Conservation International (2008, June 13). Large Areas Of Conservation Land Needed To Save Small Frogs, Turtles And Other Marine Species. ScienceDaily. Retrieved July 1, 2008, from http://www.sciencedaily.com /releases/2008/06/080610071911.htm

PHOTO: A new study found that 20 percent of threatened amphibians, and no less than 40 percent of threatened freshwater turtles, depend on broad-scale conservation action to address changes in freshwater processes. (Credit: iStockphoto/Jean-Marie Pluchon)

Ancient Komodo Dragon Has Space-age Skull

ScienceDaily (Apr. 14, 2008) — The fearsome Komodo dragon is the world's largest living lizard and can take very large animal prey: now a new international study has revealed how it can be such an efficient killing machine despite having a wimpy bite and a featherweight skull. A member of the goanna family with ancestors dating back more than 100 million years, the dragon (Varanus komodoensis) uses a combination of 60 razor-sharp serrated teeth, powerful neck muscles and what researchers are calling a "space-frame" skull to butcher prey with awesome efficiency, the study found.

They note that the dragon -- inhabiting the central Indonesian islands of Komodo, Rinca, Flores, Gili Motang and Gili Dasami -- shares the feeding and dental characteristics of extinct dinosaurs, sharks and sabre-toothed cats. Scientists Karen Moreno and Stephen Wroe from the University of New South Wales have used a computer-based technique called Finite Element Analysis (FEA) to test the bite force and feeding mechanics of the predator. Their findings are to be published in the latest issue of the Journal of Anatomy.

Normally used in the analysis of trains, planes and cars, the technique allowed the team to "reverse engineer" nature's design to assess the mechanical forces that a Komodo skull can handle. "The Komodo has a featherweight, space-frame skull and bites like a wimp," according to Wroe, "but a combination of very clever engineering, and wickedly sharp teeth, allow it to do serious damage to even buffalo-sized prey.

"The Komodo displays a unique hold and pull-feeding technique," says Dr Wroe. "Its delicate skull differs greatly from most living terrestrial large prey specialists, but it's a precision instrument, beautifully optimised to make the most of its natural cranial and dental properties. "Unlike most modern predators, Varanus komodoensis applies minimal input from the jaw muscles when killing and butchering prey. But it compensates using a series of actions controlled by its postcranial muscles. A particularly interesting feature of the skull's performance is that it reveals considerably lower overall stress when these additional forces driven by the neck are added to those of the jaw-closing muscles. "This remarkable reduction in stress in response to additional force is facilitated partly by the shape of the bones, but also by the way bone of different strengths are arranged within the skull."

The Komodo dragon grows to an average length of two to three metres and weighing around 70 kilograms. The reptile's unusual size is attributed to island gigantism, since there are no other carnivorous mammals to fill the niche on the islands where they live. As a result of their size, these lizards are apex predators, dominating the ecosystems in which they live. Although Komodo dragons eat mostly carrion, they will also hunt and ambush prey including invertebrates, birds, and mammals.

Its saliva is frequently blood-tinged, because its teeth are almost completely covered by gingival tissue that is naturally lacerated during feeding. Discovered by Western scientists in 1910, the Komodo dragon's large size and fearsome reputation makes it a popular zoo exhibit. In the wild its total population is estimated at 4,000-5,000: its

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Wild News... IN THE SPOTLIGHT

range has contracted due to human activities and it is listed as vulnerable by the IUCN.

SOURCE: University of New South Wales (2008, April 14). Ancient Komodo Dragon Has Space-age Skull. ScienceDaily. Retrieved April 22, 2008, from http://www.sciencedaily.com /releases/2008/04/080414091357.htm

PHOTO: The fearsome Komodo dragon is the world's largest living lizard and can take very large animal prey: now a new study has revealed how it can be such an efficient killing machine despite having a wimpy bite and a featherweight skull. (Credit: iStockphoto/Anna Yu)

Scientists Discover Where Snakes Lived When They Evolved Into Limbless Creatures

ScienceDaily (Feb. 3, 2004) — The mystery of where Earth's first snakes lived as they were evolving into limbless creatures from their lizard ancestors has intrigued scientists for centuries. Now, the first study ever to analyze genes from all the living families of lizards has revealed that snakes made their debut on the land, not in the ocean. The discovery resolves a long-smoldering debate among biologists about whether snakes had a terrestrial or a marine origin roughly 150 million years ago--a debate rekindled recently by controversial research in favor of the marine hypothesis.

In a paper to be published in the 7 May 2004 issue of the Royal Society journal Biology Letters, Nicolas Vidal, a postdoctoral fellow, and S. Blair Hedges, a professor of biology at Penn State, describe how they put the two theories to the test. They collected the largest genetic data set for snakes and lizards ever used to address this question. Their collection includes two genes from 64 species representing all 19 families of living lizards and 17 of the 25 families of living snakes.

Genetic material from some of the lizards was difficult to obtain because some species live only on certain small islands or in remote parts of the world. "We felt it was important to analyze genes from all the lizard groups because almost every lizard family has been suggested as being the one most closely related to snakes. If we had failed to include genes from even one of the lizard families, we could have missed getting the right answer," Hedges explains.

"For the marine hypothesis to be correct, snakes must be the closest relative of the only lizards known to have lived in the ocean when snakes evolved--the giant, extinct mosasaur lizards," Vidal says. "While we can't analyze the genes of the extinct mosasaurs, we can use the genes of their closest living cousins, monitor lizards like the giant Komodo Dragon," he explains.

The team analyzed gene sequences from each of the species, using several statistical methods to determine how the species are related. "Although these genes have the same function in each species--and so, by definition, are the same gene--their structure in each species is slightly different because of mutations that have developed over time," Vidal explains. When the genetic comparisons were complete, Vidal and Hedges had a family tree showing the relationships of the species.

"Our results show clearly that snakes are not closely related to monitor lizards like the giant Komodo Dragon, which are the closest living relatives of the mosasaurs--the only known marine lizard living at the time that snakes evolved," Vidal says. "Because all the other lizards at that time lived on the land, our study provides strong evidence that snakes evolved on the land, not in the ocean."

The research suggests an answer to another long-debated question: why snakes lost their limbs. Their land-based lifestyle, including burrowing underground at least some of the time, may be the reason. "Having limbs is a real problem if you need to fit through small openings underground, as anybody who has tried exploring in caves knows," Hedges says. "Your body could fit through much smaller openings if you did not have the wide shoulders and pelvis that support your limbs." The researchers note that the burrowing lifestyle of many other species, including legless lizards, is correlated with the complete loss of limbs or the evolution of very small limbs.

SOURCE: Penn State (2004, February 3). Scientists Discover Where Snakes Lived When They Evolved Into Limbless Creatures. ScienceDaily. Retrieved April 22, 2008, from http:// www.sciencedaily.com /releases/2004/02/040202070018.htm.

PHOTO: Elaphe guttata (Corn Snake). Copyright: S. Blair Hedges/Penn State

First Lungless Frog Discovered

ScienceDaily (Apr. 8, 2008) — Researchers have confirmed the first case of complete lunglessness in a frog, according to a report in the April 8th issue of Current Biology. The aquatic frog Barbourula kalimantanensis apparently gets all the oxygen it needs through its skin.

Previously known from only two specimens, two new populations of the aquatic frog were found by the team during a recent expedition to Indonesian Borneo.

"We knew that we would have to be very lucky just to find the frog," said David Bickford of the National University of Singapore. "People have been trying for 30 years. But when we did and I was doing the initial dissections -- right there in the field -- I have to say that I was very skeptical at first [that they would in fact lack lungs]. It just did not seem possible. We were all shocked when it turned out to be true for all the specimens we had from Kalimantan, Indonesia.

"The thing that struck me most then and now is that there are still major firsts (e.g., first lungless frog!) to be found out in the field," he added. "All you have to do is go a little ways beyond what people have done before, and -- voila!"

Of all tetrapods (animals with four limbs), lunglessness is only known to occur in amphibians. There are many lungless salamanders and a single species of caecilian, a limbless amphibian resembling an earthworm, known to science. Nevertheless, Bickford said, the complete loss of lungs is a particularly rare evolutionary event that has probably only occurred three times.

The discovery of lunglessness in a secretive Bornean frog supports the idea that lungs are a malleable trait in amphibians, which represent the evolutionary sister group to all other tetrapods, according to the researchers. Barboroula kalimantanensis lives in cold, fast-flowing water, they noted, so loss of lungs might be an adaptation to a combination of factors: a higher oxygen environment, the species's presumed low metabolic rate, severe flattening of their bodies that increases the surface area of their skin, and selection for negative buoyancy--meaning that the frogs would rather sink than float.

The researchers said that further studies of this remarkable frog may be hampered by the species' rarity and endangerment. They therefore strongly encourage conservation of the frogs' remaining habitats.

"This is an endangered frog -- that we know practically nothing about -- with an amazing ability to breathe entirely through its skin, whose future is being destroyed by illegal gold mining by people who are marginalized and have no other means of supporting themselves," Bickford said. "There are no simple answers to this problem."

SOURCE: Cell Press (2008, April 8). First Lungless Frog Discovered. ScienceDaily. Retrieved April 15, 2008, from http: //www.sciencedaily.com /releases/2008/04/080407123824.htm

PHOTO: Researchers have confirmed the first case of complete lunglessness in a frog. This little aquatic frog apparently gets all the oxygen it needs through its skin. (Credit: Courtesy David Bickford)

Rare Maud Island Frogs Hatched In New Zealand

ScienceDaily (Mar. 10, 2008) — What looks at first to be a slimy mess in a Petri dish represents a highly-significant advance in conservation and restoration ecology. Ecologists from both the Sanctuary and Victoria are celebrating the arrival of the first Maud Island frogs (Leiopelma pakeka) to hatch on mainland New Zealand for many years. Clustered together to conserve moisture, the 13 fingernail-sized baby froglets were recently transferred from the Karori Sanctuary to Victoria University where they will be incubated and later released as young frogs. No larger than a human adult's little fingernail, the Maud Island froglets differ from most frog species in that they hatch from the egg as fully-formed froglets without going through the usual tadpole stage. 13 froglets in total were found during a recent audit of a specially-constructed

Wild News... IN THE SPOTLIGHT

frog research enclosure at Karori Sanctuary.
"Sixty frogs were released into the special mouse-proof enclosure in 2006 in an effort to re-establish this highly-endangered species on the mainland," Victoria Master's student Kerri Lukis says. Ms Lukis is studying the Sanctuary population for her Master's thesis under the supervision of Associate Professor Ben Bell, Director of the University's Centre for Biodiversity and Ecological Restoration.
She says that thirty of frogs released in 2006 were later released outside of the enclosure so that the captive and wild populations could be compared. When it came time to find the frogs again to see how many frogs had survived and whether they had bred she was delighted to find the 13 froglets attached to adult males.
"This is extra special because Maud Island frogs have never been found breeding in their natural habitat before, and certainly not on the mainland.
"It's wonderful timing for 2008 - international Year of the Frog – and a Leap Year. It's rare to get a 'good news' story about frogs – every year around 35 species of frog become extinct and two of New Zealand's remaining native frog species are on the critical list."
While not the rarest species, the thimble-sized Maud Island frogs are nationally threatened. Like all of New Zealand's native frog species, they are endemic (found only here) and belong to the endemic genus Leiopelma. They have evolved very little over the last 70 million years, resulting in some very distinctive features and behaviours. For example, they don't croak, live in water, have webbed feet, or go through a tadpole stage. Associate Professor Ben Bell says the University and the Sanctuary have worked closely together on this project. "It is good to know that the Karori Sanctuary frogs are able to breed in an enclosure there. Whether those frogs released into the wild in Karori survived and bred is less certain at present."
SOURCE: Victoria University Of Wellington (2008, March 10). Rare Maud Island Frogs Hatched In New Zealand. ScienceDaily. Retrieved March 16, 2008, from http://www.sciencedaily.com /releases/2008/03/080305194942.htm
PHOTO: Adult Maud Island frog. The thimble-sized frogs are nationally threatened in New Zealand. (Credit: Copyright Karori Sanctuary)

Lizards Undergo Rapid Evolution After Introduction To A New Home

ScienceDaily (Apr. 18, 2008) — In 1971, biologists moved five adult pairs of Italian wall lizards from their home island of Pod Kopiste, in the South Adriatic Sea, to the neighboring island of Pod Mrcaru. Now, an international team of researchers has shown that introducing these small, green-backed lizards, Podarcis sicula, to a new environment caused them to undergo rapid and large-scale evolutionary changes.
"Striking differences in head size and shape, increased bite strength and the development of new structures in the lizard's digestive tracts were noted after only 36 years, which is an extremely short time scale," says Duncan Irschick, a professor of biology at the University of Massachusetts Amherst. "These physical changes have occurred side-by-side with dramatic changes in population density and social structure."
Researchers returned to the islands twice a year for three years, in the spring and summer of 2004, 2005 and 2006. Captured lizards were transported to a field laboratory and measured for snout-vent length, head dimensions and body mass. Tail clips taken for DNA analysis confirmed that the Pod Mrcaru lizards were genetically identical to the source population on Pod Kopiste.
Observed changes in head morphology were caused by adaptation to a different food source. According to Irschick, lizards on the barren island of Pod Kopiste were well-suited to catching mobile prey, feasting mainly on insects. Life on Pod Mrcaru, where they had never lived before, offered them an abundant supply of plant foods, including the leaves and stems from native shrubs. Analysis of the stomach contents of lizards on Pod Mrcaru showed that their diet included up to two-thirds plants, depending on the season, a large increase over the population of Pod Kopiste.
"As a result, individuals on Pod Mrcaru have heads that are longer, wider and taller than those on Pod Kopiste, which translates into a big increase in bite force," says Irschick. "Because plants are tough and fibrous, high bite forces allow the lizards to crop smaller pieces from plants, which can help them break down the indigestible cell walls."
Examination of the lizard's digestive tracts revealed something even more surprising. Eating more plants caused the development of new structures called cecal valves, designed to slow the passage of food by creating fermentation chambers in the gut, where microbes can break down the difficult to digest portion of plants. Cecal valves, which were found in hatchlings, juveniles and adults on Pod Mrcaru, have never been reported for this species, including the source population on Pod Kopiste.
"These structures actually occur in less than 1 percent of all known species of scaled reptiles," says Irschick. "Our data shows that evolution of novel structures can occur on extremely short time scales. Cecal valve evolution probably went hand-in-hand with a novel association between the lizards on Pod Mrcaru and microorganisms called nematodes that break down cellulose, which were found in their hindguts."
Change in diet also affected the population density and social structure of the Pod Mrcaru population. Because plants provide a larger and more predictable food supply, there were more lizards in a given area on Pod Mrcaru. Food was obtained through browsing rather than the active pursuit of prey, and the lizards had given up defending territories.
"What is unique about this finding is that rapid evolution can affect not only the structure and function of a species, but also influence behavioral ecology and natural history," says Irschick.
SOURCE: University Of Massachusetts, Amherst (2008, April 18). Lizards Undergo Rapid Evolution After Introduction To A New Home. ScienceDaily. Retrieved April 22, 2008, from http: //www.sciencedaily.com /releases/2008/04/080417112433.htm
PHOTO: Pod Mrcaru lizard. (Credit: Anthony Herrel of the University of Antwerp)

Lizard Hunting Styles Impact Ability To Walk, Run

ScienceDaily (Apr. 21, 2008) — The technique lizards use to grab their grub influences how they move, according to researchers at Ohio University. A research team led by doctoral student Eric McElroy tracked 18 different species of lizards as they walked or ran in order to understand how their foraging styles impact their biomechanics. Lizards use two basic foraging techniques. In the first approach, aptly dubbed sit-and-wait, lizards spend most of their time perched in one location waiting for their prey to pass. Then, with a quick burst of speed, they run after their prey, snatching it up with their tongues.
In the other form of foraging, known as wide or active foraging, lizards move constantly but very slowly in their environment, using their chemosensory system to stalk their prey, according to the research team, which included McElroy's adviser Stephen Reilly, professor of biological sciences, and undergraduate honors thesis student Kristin Hickey. Although wide foraging evolved from the sit-and-wait technique, these two styles are almost opposites. Some wide foragers are on the move about 80 percent of the time while sit-and-wait foragers may move only about 10 percent of the time, said Reilly, co-author of a recent book on the topic, Lizard Ecology, published by the Cambridge University Press.
While all lizards have the ability to run, a predatory defense mechanism, the study found that sit-and-wait lizards won't walk. Lizards that use the sit-and-wait method of foraging use running mechanics even when moving at slower speeds. Wide foragers, however, evolved a walking gait and mechanics. They must move at slower speeds in order to use their advanced chemosensory system to locate their prey. Foraging and locomotion are so closely linked, in fact, that three groups of wide foragers that

had reverted to using the sit-and-wait technique actually lost the ability to walk, the researchers reported. "The most interesting aspect of this research is that it demonstrates a clear link between animal behavior and functional morphology. It's quite amazing and surprising that the behavioral diversity that everyone knows about and is inspired by is grounded in form, function and physiology," McElroy said. The researchers used a race track with a built-in force plate to record the forces generated by the lizards and a high-speed video camera to record each critter moving at various speeds. The scientists collected data from the force plate and analyzed the video to determine whether the lizard was using running or walking mechanics.

The study used a large, representative sample of lizards made up of 18 different species, such as skinks, iguanas and monitor lizards. This extensive study uses one of the largest data sets for center of mass mechanics, McElroy said, and is one of the few that focuses on reptiles instead of mammals. "Everybody works with people, dogs or horses. But they're all freaks," Reilly said. "They've gone erect, they have extra joints. They are the kings of bouncing vaulting and running fast. We are working on the sprawlers."

SOURCE: Ohio University (2008, April 21). Lizard Hunting Styles Impact Ability To Walk, Run. ScienceDaily. Retrieved April 22, 2008, from http://www.sciencedaily.com /releases/2008/04/080421145204.htm

PHOTO: Scientists studied lizard walking and running mechanics on a race track with a built-in force plate. (Credit: Photo by Stephen Reilly, Ohio University)

Snakes Vault Past Toxic Newts In Evolutionary Arms Race

ScienceDaily (Mar. 13, 2008) — Snakes don't eat fugu, the seafood delicacy prepared from blowfish meat and famed for its poisonous potential. However, should a common garter snake wander into a sushi restaurant, it could fearlessly order a fugu dinner. The snakes have evolved resistance to the blowfish poison, tetrodotoxin (TTX), by preying on rough-skinned newts, which also secrete the toxin. Some newts are so poisonous that they harbor enough TTX to kill a roomful of adult humans. Why would a small animal produce such an excessive amount of poison? The answer lies in the evolutionary back-and-forth between newts and garter snakes. Throughout much of their shared territory, newts and snakes have been locked in a kind of arms race: TTX-resistant snakes cause natural selection to favor ever-more poisonous newts, and the new-and-improved newts drive selection for higher resistance in snakes. In a new study Charles Hanifin, a postdoctoral scholar at Stanford's Hopkins Marine Station, and his co-authors say that snakes in some areas may have prevailed in the evolutionary arms race between predator and prey. Surprisingly, snakes in several geographic locations have developed such extreme resistance to TTX that newt production of the toxin cannot keep up.

Most toxic amphibians in the world

Some populations of newts produce enough TTX to kill thousands of mice or 10 to 20 humans. Ounce for ounce, Hanifin said, they are even more toxic than South America's famed poison dart frogs. "Some populations of these newts may very well represent the most toxic amphibians on the planet," Hanifin said.

The poisonous newts have even killed off humans. The Journal of the American Medical Association reports the case of a 29-year-old man who died after swallowing an 8-inch-long newt on a dare. The journal also describes the case of a 26-year-old man in Oregon who managed to survive his encounter with the newts. After swallowing five of the animals to win a bet, he felt dizzy, began vomiting and was too weak to walk, though he later recovered under a doctor's care. These incidents aside, the newts rarely harm humans. It is safe to handle the newts with bare hands, since the toxin is not absorbed through the skin. A newt must be ingested to be toxic, and Hanifin said the animal emits an acrid smell that probably discourages most pets and children from tasting it.

Escaping the arms race

At first glance, the newt and garter snake populations seem to be evenly matched. The most toxic newts are found in the same areas as highly resistant snakes, and areas without toxic newts house only non-resistant snakes.

Data on the garter snakes came from Hanifin's collaborators, Edmund Brodie Jr. of Utah State University and Edmund Brodie III of the University of Virginia, who measured snake resistance to TTX by injecting the animals with the toxin and measuring how fast they subsequently slithered. Although TTX does not kill resistant snakes, it often slows them down for a while. Less-resistant snakes move slower after TTX injection, and some are even temporarily paralyzed. To get a closer look at the snake-newt interaction, Hanifin and colleagues tested 383 newts from 28 locations where the Brodies had previously examined garter snake TTX resistance. Collection spots stretched down the West Coast from British Columbia to Central California.

Hanifin found that snakes were pulling ahead of the newts in several places. In one third of the locations, the most toxic newt could still be eaten by the least resistant snake. This means that all snakes in the population do just as well regardless of their TTX resistance level, and there is no evolutionary pressure for the snakes to develop stronger resistance. "In these areas, I think the snakes have won," Hanifin said.

How have snakes managed to become super-resistant to TTX, while newt production of the toxin lagged behind? It seems there are only a handful of snake genes involved in resistance, meaning TTX resistance in snakes can evolve quickly and in great leaps, Hanifin said. Newt genetics appear to work differently, with increasing toxicity arriving only through smaller incremental changes. Newts are also limited by their own biology. They are only resistant to TTX, not immune to it. A few milligrams of TTX injected into a newt's gut are lethal, so the animal sequesters the toxin in its skin. While the most toxic newts had 14 to 15 milligrams of TTX, some garter snakes are resistant to up to 100 milligrams of TTX. To hold that much toxin, the tiny newts would be one part toxin to nine parts skin-a near physical impossibility, according to Hanifin. Though snakes may have won this round, Hanifin said their good fortune may not last forever. There is some evidence that TTX resistance comes at a price: Really resistant snakes have slower crawl speeds than snakes with little or no resistance. If there is no advantage to a snake for being super-resistant, and super-resistance has an evolutionary cost, the snakes could eventually end up with a lowered resistance, to the point where the newts' toxin levels would again be effective. Though Hanifin said the idea was plausible, it would take years of experiments to confirm.

Collecting and testing newts

Together with his father, a research dermatologist, Hanifin devised a method of measuring the newt's toxin levels using the same kind of surgical punch used to take skin for biopsies. Hanifin removed a half-centimeter circle of skin from the backs of anesthetized newts and then ground up the skin samples to analyze the amount of toxin present. Getting accurate measurements was tough, and Hanifin spent two months in Japan learning techniques from blowfish researchers. After the procedures were ironed out, Hanifin and his colleagues spent five years collecting enough newts to test. Hanifin said the newts make convenient field animals. "They're pretty mellow; they don't get real worked up about being handled," he said. "If you're collecting them in a pond, they just kind of float around you."

The newts' toxicity means they can afford to be lax about evading rubber-booted researchers, and Hanifin caught most of the animals by hand. He said he did not envy the snake collectors, who chased the rapid-slithering animals through grass and underbrush.

Hanifin got help collecting from people in his lab and from Oregon State University, the University of Oregon, researchers in Washington and California, and the California Department of Fish and Wildlife. "Literally dozens of people contributed," Hanifin said. "It was a really collaborative effort." Future directions of Hanifin's research include learning more about human disease by exploring the genetics of resistant garter snakes. TTX blocks electrical signaling in nerve cells by stopping up a sodium channel, and TTX-resistant snakes have a modified channel that the toxin does not recognize. In humans, defects in similar sodium channels can lead to serious illness, including some types of epilepsy, and insight into sodium channel biology could help treat these diseases.

SOURCE: Stanford University (2008, March 13). Snakes Vault Past Toxic Newts In Evolutionary Arms Race. ScienceDaily. Retrieved March 16, 2008, from http://www.sciencedaily.com /releases/2008/03/080311075326.htm

Striped Marsh Frog
(Limnodynastes peronii)

Also known as the Brown Striped Marsh Frog or Brown Frog. Described in 1841 by the well-known French naturalists Dumeril and Bibron as Cystignathus peronii from Australia. The type specimens are housed at the Museum of Natural History in Paris.

Adult frogs grow to from 4.6 – 7.3 cm, as with most frog species the females are larger than males. In north Queensland this species may be confused with the Striped Rocket Frog (Litoria nasuta) which has a sharper snout and longer back legs.

This is one of the most common and adaptable frogs of eastern Australia. It occurs from far south-eastern South Australia through southern and north-eastern Victoria right up the east coast and hinterland of New South Wales and Queensland to north of Cairns. In the far north it is particularly common on the tablelands, and appears to be becoming more widespread.

This is a terrestrial, nocturnal frog which can be found along small streams, ponds, swamps, rainforest edges, drains in fact just about any body of water. Its range has extended into rainforests (at least along roads). I once went spotlighting at the Crater and was standing at the top of the massive crater and heard a tiny little call from way down in the hole – it appeared that at least one Marsh Frog had made its way down there somehow.

The call can be described as a short tock, pop or whuck, composed of a single note. Occasionally the call can be composed of more than one note, and of course when heard in large numbers the individual calls happening together can sound to the human ear quite different. When large numbers of these frogs are calling it sounds like a giant bowl of rice bubbles!

Marsh frogs are usually heard but not seen and they may be very difficult to find. Male frogs may call by day from the land but calling at night is usually from the water, usually floating in a concealed position beneath overhanging banks or vegetation or next to grass tussocks or other water debris. Even when located by sound it may take considerable patience to finally sight the frog.

Eggs are usually laid in static water, in a foam nest characteristic of the genus however frogs from western Victoria and south-eastern South Australia apparently do not make a nest, lacking the flanges on the fingers with which females normally "whip up" the foam during amplexus.

Tadpoles grow to a length of 6cm and may live up to 11 months before metamorphosis. The development of eggs and tadpoles of many frog species is dependent on temperature, with higher temperatures usually resulting in higher temperatures.

Females may be found floating beside their foam nests

AUTHOR & PHOTOS: Michael Anthony.

From Frogs Australia...

Family: Myobatrachidae

Common name: Striped Marshfrog; Brown-striped Frog; Brown Frog

Scientific name: *Limnodynastes peronii*

Description: This frog is light brown or grey-brown on its back with darker brown stripes. Most individuals have a pale stripe running down the middle of the back. The arms and legs are scattered with irregular dark spots and bands. The belly is white. There is a pale raised stripe running from below the eye to the arm. The skin is smooth and the toes have almost no webbing.

Size: 65 mm

Habitat:This frog lives near bodies of permanent still water including ponds in suburban gardens. During the day it hides under logs, stones and leaf litter. This species also appears to be tolerant of polluted water.

Call: Sounds like a loud "tok" or "whuck", repeated at intervals.

Breeding: Males begin to call on land - they then move into shallow water and continue their calling. They usually call from the water at night. Breeding occurs throughout the warmer months and females usually lay up to 1000 eggs.

Eggs: Are laid in a floating foam nest often hidden amongst vegetation.

Tadpoles: Are very large and dark grey to black in colour.

Similar species: This species can be distinguished from *Limnodynastes tasmaniensis* and *Limnodynastes fletcheri* as it has stripes instead of spots.

Tablelands Frog Club

Mail Bag 71
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http://www.tablelandfrogclub.com

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o $15.00 Adult membership o $15.00 Family membership o $5.00 Junior/Associate

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The Croaker

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April 2009

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