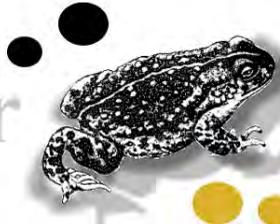

The Natter Jack



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NEWSLETTER OF THE BRITISH HERPETOLOGICAL SOCIETY



Scientists have known for quite some time that plants, algae, some bacteria and a few invertebrates were capable of taking advantage of photosynthesis, which converts sunlight directly into energy. But now, for the first time, a photosynthetic vertebrate has been found.

The incredible creature is none other than the fairly common spotted salamander (*Ambystoma maculatum*). The spotted salamander is not a new species for researchers, and it has long been known that the animal's embryos share a symbiotic relationship with photosynthetic algae. That relationship, however, was always assumed to be an *outside* one, whereby the algae and the salamander work separately toward a fair exchange of resources.



THE BRITISH HERPETOLOGICAL SOCIETY

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It turns out that researchers just weren't looking closely enough. While studying a batch of salamander embryos, scientist Ryan Kerney of Dalhousie University (Canada) saw something different than the prevailing dogma would suggest - a bright green colour coming from *inside* their cells.

That colour usually indicates the presence of chlorophyll, which is the light-absorbing green pigment that makes photosynthesis possible.

"On a lark, I decided to take a long-exposure fluorescent image of a pre-hatchling salamander embryo," said Kerney. After backing that experiment up using transmission electron microscopy, he confirmed his suspicion. There were algal symbionts located inside the salamander cells.

The reason this discovery is surprising is because all vertebrates have what's known as an adaptive immune system, which naturally destroys any foreign biological material found inside the cells. How the algae in the salamander's cells bypass this defence is a mystery.

Even more interesting, Kerney also discovered that algae is present in the oviducts of adult female spotted salamanders, where the embryos form in their sacs. This means that it's possible symbiotic algae are passed from mother to offspring during reproduction.

Although this is the first time such a close co-existence with a photosynthetic organism has been found in a vertebrate, the discovery leaves open the question about if other animals might harbour similar traits ❖

Source: Bryan Nelson - www.mnn.com

World's Rarest Snake Making a Comeback

The Antigua racer (*Alsophis antiguae*) shares a similar story with many highly endangered island species. Invasive mongooses killed every racer on the Caribbean island of Antigua, leaving only a small population on nearby Great Bird Island. Confined to eight hectares, this final population was being killed-off by invasive Eurasian black rats. By the time conservationists took action, only 50 Antigua racers survived in the world. The outcome seemed grim...But fifteen years later, a partnership between six conservation groups has succeeded in raising the

population tenfold to 500 snakes and expanded its territory to other islands through snake-reintroductions.

"I am proud we proved the pessimists wrong, and turned the fortunes of this unique and endearing animal. Many people have contributed over the years, but special credit must go to the local volunteers," said Dr. Jenny Daltry, Senior Conservation Biologist with Fauna and Flora International (FFI). FFI is a part of the Antigua Racer Conservation Project, which includes five other international and local conservation organisations.

The Antiguan Racer Conservation Project began by eradicating rats from Great Bird Island as well as twelve other offshore islands, which since 2006 have been included in a marine protected area, the North East Marine Management Area. Following eradication, the project carefully reintroduced the snake to other small islands, increasing the Antiguan racer's habitat from eight hectares to 63. However this is only 0.1% of the species' original range. The project has also worked with locals, who used to sometimes kill the snake, to teach them to appreciate the rare species, unique to these few islands.

Threats remain for the snake, categorised as Critically Endangered by the International Union for Conservation of Nature (IUCN) Red List, including climate change impacts such as rises in sea level or worsening hurricanes, which could swamp the islands. Researchers are currently looking for higher areas to reintroduce the species ❖

Source: *Jeremy Hance, www.mongabay.com*



Antiguan racer © Jenny Daltry

Ali the Wandering Crocodile

It's not a sight you see everyday — a ten foot crocodile snoozing by the side of a busy city road. But German police came face to face with exactly that when Ali the 65-year old crocodile decided to give his handlers the slip and take a leisurely tour around Frankfurt.

Police in Germany's financial capital said they apprehended the crocodile after a shocked driver spotted him lying by the side of the road. Ali had been in Frankfurt to take part in a reptile show but somehow managed to break out of his container.

"Evidently the container wasn't shut properly so Ali took the chance to explore the city by himself," police said ❖ *Source: Reuters*

Editor's Note: *Good job he didn't fancy a spot of lunch!*



Gecko Smuggler Caught with His Pants Down

A German reptile collector has been jailed for 14 weeks and must pay a NZ\$5,000 (£2440) fine after attempting to board a plane in New Zealand with more than 40 geckos and skinks concealed in his underwear.

Judge Colin Doherty ordered Hans Kurt Kubus, 58, be deported as soon as he is released from prison.

Kubus was convicted of plundering New Zealand's wild gecko and skink populations after he was caught by wildlife officials at Christchurch International Airport in December with 44 geckos and skinks in a hand-sewn package concealed in his underwear.

He admitted trading in exploited species without a permit and hunting protected wildlife without authority, pleading guilty to two charges under the Wildlife Act and five under the Trade in Endangered Species Act.

Mike Bodie, Department of Conservation prosecutor, told Christchurch District Court that Kubus could have faced potential maximum penalties of half a million dollars and six months in prison.

Mr Bodie told Judge Doherty that the department sought a deterrent sentence for "the most serious case of its kind detected in New Zealand for a decade or more." ❖ *Source: The Telegraph (UK)*

Hilarious Herps



There were times when Stanley regretted his stint as a lab snake during the Viagra trials of '97

How the Sea Snake Got Its Stripes

Professor Rick Shine and Dr Adele Pile from the School of Biological Sciences have discovered a sea snake's colouration can influence its susceptibility to algal fouling which can reduce swimming speed by up to 20 percent. Their study sheds new light on how the transition from terrestrial to aquatic life has shaped the evolution of sea snakes.

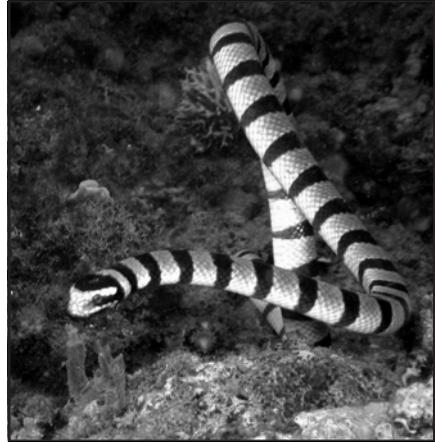
Professor Shine said sea snakes evolved from venomous land snakes - such as the highly toxic tiger snake - that reinvaded the oceans around five million years ago.

"The fact that sea snakes have made the transition from terrestrial to aquatic life, makes them the perfect model to study evolution because we can compare traits between land snakes and sea snakes and hence identify selective forces unique to those habitats," he said.

"The shift from land to water brought with it a new set of challenges, and sea snakes evolved unique physical traits which enabled them to survive in the aquatic environment - a paddle-shaped tail for swimming, valves to close their nostrils and large lungs to provide oxygen while under water.

"Another consistent attribute of sea snakes involves coloration: most are banded rather than unicoloured, blotched or striped. Fouling by algae has also been reported in several groups of sea snakes, and we wondered if maybe a snake's colour could influence its susceptibility to this."

To test this hypothesis, the scientists turned to a population of sea snakes in the tropical Pacific, in which members of the same species ranged from jet black to



Banded sea snake © Jenny Daltry

brightly black-and-white banded, and many patterns in between. Over a four-year period, the researchers examined free ranging individuals and found that black snakes supported significantly more algal cover than black-and-white snakes. "Once we knew there was a relationship between a snake's colour and the amount of algal fouling, the next step was to determine if a snake's dark colour was the actual cause of the higher algal levels," Professor Shine said.

To do this, the researchers suspended plastic snake models - in black, white and black-and-white - in mid water and scored the amount of algal colonisation over the subsequent days. The results showed that colour directly affects the amount of algal growth, with black surfaces attracting the most algae, followed by black-and-white, and white the least.

"The spores of some marine algae settle out preferentially onto dark-coloured objects, which probably explains why the darker snakes hosted higher algal cover," he said.

The finding raises the crucial question:

if snake colour influences rates of algal accumulation, what are the consequences of such accumulation?

“The most obvious such consequence is increased drag and things became really interesting when we tested to see if algal cover affected a snake’s swimming speed. Our locomotor trials revealed a 20 percent reduction in swimming speeds in snakes covered with a heavy coating of algae.”

Differences in colour involving black versus banded varieties of land snakes typically have been attributed to differences in heat transfer - that is darker colours absorb more heat, even at the expense of looking more obvious to predators.

But Professor Shine said temperature based explanations can’t be applied to the case in sea snakes.

“Unlike on land, colour does not affect the body temperatures of a snake under water. Our data suggests another potential fitness cost of colour in sea snakes, and potentially that of other aquatic animals: susceptibility to algal fouling,” he said.

So why are some sea snakes black at all? Is there some hidden benefit to being black that outweighs the increased algal fouling?

“There is clearly a balance of costs and benefits of algal accumulation, which is why we see a variety of colours in the population. For example, a covering of seaweed may slow down the snake and reduce its ability to obtain oxygen from the water directly through its skin, because the algae form a barrier. But on the flip side, the algae might increase the snake’s oxygen availability, because of algal photosynthesis, and hence benefit the snake.” ❖ *Source: Science Daily*

Ranavirus Decimating UK Frog Populations

Research conducted by the Zoological Society of London (ZSL) has revealed that common frog (*Rana temporaria*) populations across the UK are suffering dramatic population crashes due to infection from the emerging disease ranavirus.

Using data collected from the public through the ‘Frog Mortality Project’ and Froglife, scientists from ZSL found that, on average, infected frog populations experienced an 81% decline in adult frogs over a 12 year period.

“Our findings show that ranavirus not only causes one-off mass-mortality events, but is also responsible for long-term population declines. We need to understand more about this virus if we are to minimise the serious threat that it poses to our native amphibians,” says Dr Amber Teacher lead researcher (ZSL).

Despite a number of populations suffering from infection year-on-year, other populations bounced-back from mass-mortality events. This suggests that some frogs may have some form of immunity to ranaviral infection.

“The discovery of persistent populations in the face of disease emergence is very encouraging and offers hope for the long-term future of this species” says Lucy Benyon from Froglife. “However, we still need regular information from the public on what is happening in their ponds to continue this essential research.”

In the 80s and 90s, the disease was particularly associated with the southeast of England. In recent years new ‘pockets’ of diseases have turned

up in Lancashire, Yorkshire and along the south coast.

“It is very difficult to treat wildlife diseases and so the mystery that we desperately need to solve is how the disease spreads. Understanding more about the ecology of the disease will allow us to offer advice to the public on how to limit the spread of infection, which could also prevent the movement of other frog diseases in the future,” says co-researcher Dr Trent Garner (ZSL). ❖

Source: Science Daily

Words of the Wise?

'Always carry a flagon of whiskey in case of snakebite and furthermore always carry a small snake'.

W. C. Fields ❖

'I'm not about to go out and buy a snake for a pet. I mean, I may have faced a few fears but I'm not insane'

Kristin Davis ❖



Sonic Boom Romance for Crocs

The supersonic booms of Israeli aeroplanes training over a nearby crocodile nursery are causing an unnatural mating season for its scaly inhabitants.

While the animals may very well be delighted that love seems to be in the air more than usual lately, crocodile handler David Golan believes the jet-inspired drive to mate is cause for concern. The crocs, which normally mate in spring, are having their biological clocks thrown off by the unnatural noise.

To make matters worse, the crocodiles are none the more satisfied by the mating call confusion. The crocs have been observed bellowing back their own song, but for some reason they never seem to partner up with any mate - as if it's just the jet overhead that has won them over, though it never ceases to play hard-to-get: how frustrating! ❖

Source: www.kingsnake.com



New Monitor Lizards Identified

German scientist André Koch from the Zoological Research Museum Alexander Koenig (ZFMK) in Bonn together with his supervisor Prof. Wolfgang Böhme and another colleague have described two new monitor lizard species and one new subspecies from the Philippines in a recent article. Their comprehensive study of the Philippine water monitors revealed that despite the recently discovered fruit-eating monitor species from the main island of Luzon by an American-Philippine research team, the real diversity of these lizards in the archipelago is still not yet understood.

The species descriptions were published in *Zootaxa*, the world's foremost journal for taxonomic zoology.

“After the spectacular discovery of several new monitor lizards from the Indonesian island of Sulawesi three years ago, our results now illustrate that the diversity of water monitor lizards in the Philippines has also been largely underestimated” says André Koch.

Prof Böhme, vice-director of the ZFMK and head of the herpetology section, has been researching monitor lizards for more than 20 years, said, “It’s amazing that these lizards have been overlooked for so long. It demonstrates that even with large vertebrates not all species of our planet are recognised and named.”

Dr Maren Gaulke (GeoBio-Center LMU, Munich), an expert on Philippine reptiles, particularly monitor lizards, has been studying the biology of these impressive reptiles for 25 years. “Monitor lizards are fantastic creatures. They are agile, powerful, and the most intelligent lizards of the world.”

The three new Philippine monitors were identified based on examination of numerous preserved voucher specimens in various major European natural history museums, in combination with long-term studies in the field. This demonstrates the immense importance of museum collections as an archive for global biodiversity. ❖ *Source: Science Daily*



Varanus palawanensis © Ingo Langlotz



Varanus bitatawa © Elga D. Reyes

When Snake Fangs Moved Out of the Groove

Fossilised teeth from an ancient reptile are revealing the way the venom injection system in modern snakes first evolved.

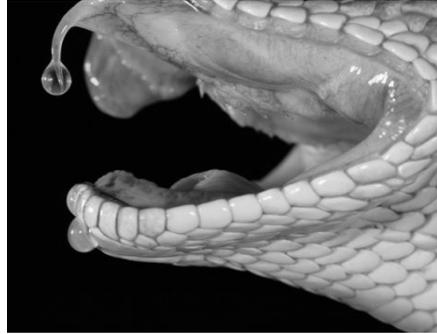
The research, reported in the journal *Naturwissenschaften*, focused on *Uatchitodon*, a reptile of the late Triassic period, around 200 million years ago, and known only from its teeth. Although not closely related to snakes, *Uatchitodon*'s hollow fangs suggest it was venomous, and it has given researchers a glimpse into how syringe-like teeth can arise.

Modern venomous snakes have tube-like fangs that inject poison directly into their victims, helping them to kill prey without a struggle. But how this system evolved has been something of a mystery. The oldest venomous snakes in the fossil record, from the Miocene epoch, around 5 million-20 million years ago, already had hollow teeth perfectly adapted to inject venom.

One possible explanation is that hollow fangs evolved from grooved teeth like those of today's Gila monsters, which use them to mix painful venom into the flesh of their victims as they chew. But fossil evidence for this has been scant.

Developmental biologists analysing tooth formation in snakes have generally agreed with this idea. As fangs grow in a snake's mouth, they change shape. Before they erupt they have an open groove, but emerge from the gum line as a sealed tube. Yet whether this developmental path reflects venomous snakes' evolution has been a matter of speculation.

Jonathan Mitchell at the University of Chicago in Illinois, the lead author of the new study, realised that *Uatchitodon*



might provide a glimpse into the evolution of venom injection. The roots of its teeth suggest that the animal is more closely related to dinosaurs and alligators than to modern snakes, but the 'hypodermic needle' structures found in many specimens are remarkably similar to snake fangs and probably followed a similar evolutionary path.

Uatchitodon fossils are found at three major locations: Tomahawk in Virginia, Moncure in North Carolina and the Placerias Quarry in Arizona. All of the sites date from the late Triassic, with the Tomahawk specimens older than the other two. Mitchell and his colleagues analysed *Uatchitodon* teeth from the different sites and found that the fossils from Tomahawk had grooves instead of fully developed tubes.

In the oldest fossils from Tomahawk, the venom canal was a shallow groove, extending from the base of the tooth less than a quarter of the way to the tip. Later teeth from the site had a longer and deeper groove. In specimens from Moncure and the Placerias Quarry, the groove had become all but sealed in, with just a hair-like seam to mark it, creating a canal that could convey venom once the tooth had pierced the skin.

The researchers interpret these changes as a demonstration of evolution in action. “The tubes in the teeth of uatchitodon seem to have evolved from grooves,” says Mitchell.

In all, the researchers found 14 uatchitodon specimens from Tomahawk with grooved teeth, and 26 from Moncure and Placerias with fully developed tubes. They argue that these actually represent two separate species of uatchitodon, an older one that chewed venom into its prey like a Gila monster and a later one that injected venom with hollow teeth.

The progression seen in the uatchitodon teeth is very similar to the development of snake replacement fangs, in which early-stage fangs form a groove, and late-stage fangs are tubular. “This fossil really suggests that you can’t get hollow fangs any other way,” says herpetologist Dr. Wolfgang Wüster at Bangor University, UK.

This progression makes sense, he says, because Gila-style grooved teeth would benefit animals even in the initial evolutionary stages. For alternative possible methods of producing a fang, such as boring a tube straight through a tooth, this would not be the case.

Yet questions still remain, because researchers can only glean so much information from the teeth alone. For example, Dr. Wüster says that finding uatchitodon jaws would be important, to check whether specimens with hollow fangs — but not those with grooved teeth — had compressor muscles that could squirt venom into prey. “A syringe without a plunger is pretty useless, so I’d love to get a look at the jaws,” says Dr. Wüster. ❖

Source: www.nature.com

Frog Bladders Hold Surprises

Australia’s desert frogs are famously able to store up large amounts of water in their bladder to last them through the drought. But now researchers from Charles Darwin University in the Northern Territory (Australia) have found that frog bladders can hold another, even more bizarre surprise.

Chris Tracy and colleagues report in the Royal Society journal *Biology Letters* that frogs have a unique way of dealing with foreign objects that become lodged in their bodies: they store and even expel them from the bladder.

After finding that frogs implanted with radio transmitters in the field became mysteriously separated from the devices, the researchers implanted small beads into the body cavities of tree frogs and cane toads to see what would happen. Within nine days, all the tree frogs had expelled the beads completely from the body via their bladder, while the beads in the cane toads had migrated to the bladder and stayed there.

“The bladder of frogs appears to be a unique pathway of expulsion of foreign objects from the body,” says Tracy.

Animals such as fish and snakes - and even humans - are known to expel objects out of the body through the skin or the intestine. But, says Tracy, they were surprised to find that a two-centimetre-long transmitter implanted in the body cavity of an eight-centimetre-long frog could migrate to the bladder.

The researchers wanted to know how the bead came to be in the bladder, so they dissected implanted cane toads over a number of days to see where it went. Tracy says tissue grows out from the bladder

and wraps around the bead, eventually enveloping it and drawing the bead into the bladder. So why would frogs have such a special adaptation?

Tracy speculates that because frogs eat live insects, some of the sharp insect body parts could break off and become lodged in their body.

“The other thing about frogs is their jumping. They aren’t very coordinated and they tend to crash land. They have relatively thin skins, so it’s easy to imagine a frog landing on something spiny that could poke into their body that way,” he says.

“If you have something roaming around inside the body, it’s usually a bad thing. It could poke through a vital organ, so it’s a good idea to get rid of it.”

Tracy says his findings are a cautionary note for other researchers implanting transmitters into animals.

“Finding that your study animal has become separated from your transmitter may not mean it has been eaten by a predator. It might have just expelled the object.” ❖

Source: Abby Thomas, ABC Science online

Link Between Ancient Lizard Fossil in Africa and Today’s Komodo Dragon in Indonesia

University of Alberta researchers have unearthed a mysterious link between bones of an ancient lizard found in Africa and the biggest, modern-day lizard of them all, the Komodo dragon, half a world away in Indonesia. Biologists Alison Murray and Rob Holmes say the unique shape of the vertebrae links the 33-million-year-old African lizard fossil with its cousin the Komodo, which has only been around for some 700,000 years.

“The African fossil was found on the surface of a windswept desert,” said Holmes. “It’s definitely from the lizard genus *Varanus* and there are more than 50 species alive today, including komodos and other large lizards.”

Holmes says the tell-tale African vertebrae fossils belonged to a lizard that was about a metre-and-a-half long whose ability to swim may be key to figuring out how, more than 30 million years later, its ancestors turned up on the other side of the world.

Holmes says the ancient African *Varanus* specimen was found on land that was once the bottom of a river or small lake. “Whether the animals lived in the water or surrounding land, we don’t know, but we do know that some modern day species of *Varanus* are comfortable swimming in fresh water.”

The researchers agree that fresh-water swimming wouldn’t get the African lizard all the way to Indonesia. Murray says the mystery of how the animals spread deepens when you consider ancient world geography. “From about 100 million years ago until 12 million years ago, Africa was completely isolated, surrounded by ocean, but somehow they got out of Africa during that period,” said Murray. “That’s why this paper is important because there was no known land connection.”

Murray says one unproven theory of how *Varanus* moved out of Africa is that over millions of years, small land masses or micro-plates may have moved from one place to another, carrying their fauna with them. ❖

Source: Science Daily

The British Herpetological Symposium



On the **8th and 9th of April** this year Bangor University Herpetological Society, in affiliation with the BHS and ARG UK, will be hosting the first of the annual British Herpetological Symposiums. The symposium will be a platform for British herpetologists to converse on current advances across an array of relevant fields.

The symposium will be £30 for both days or £20 for a single day to cover essential running costs. This fee is payable in advance before Friday the 18th of March.

Call for papers

We are looking for interested parties to present their work at this year's symposium. Presentations can cover completed or ongoing work in any herpetological field

Proposals should be submitted in the format of:

1. Title
2. Author(s) – with the person present in bold
3. Institute / address of all authors
4. Abstract
5. Keywords

The information should be attached to an email in a .doc file to:

Chair.herpsymposium@gmail.com by Monday 28th February. All files will be reviewed in preparation for an open access abstract book prior to symposium start.

All enquiries should be sent to **herp.symposium@gmail.com**



Common frog © Paul Derbyshire



Black adder © Paul Smith