



BEHIND BAARS

A publication of
The Bay Area Amphibian and Reptile Society
sponsored by the Palo Alto Junior Museum
1451 Middlefield Road, Palo Alto, CA 94301
Vol 5 (May 2009)
(408) 450-0759 (BAARS Voice-mail phone)

VENEMOUS ISSUE!

How The Snake Got Its Fangs

It likely all started when the back of the mouth departed from the front.....

By Amy Maxmen

“How’d you get those newfangled teeth?” hissed the petite garter snake to the venomous cobra. “Same way that you got yours,” cobra replied. All fangs — no matter their size, shape or position — descend from a single evolutionary event, new evidence from a study of snake embryos suggests.

“I’m sky high on this piece of work,” comments Ken Kardong, a biologist at Washington State University in Pullman WA, who has been studying snake evolution for more than 30 years. “This will become a textbook example in evolutionary biology identifying how development produces diversity in the natural world that natural selection can then act on.”

The new study, led by Freek Vonk of Leiden University in The Netherlands, reveals that snakes didn’t reinvent the wheel with each new version of their venom- delivery systems. The report appears in the July 31 issue of Nature magazine.

“They’ve shown there is a single underlying way of building things that has been elaborated different ways, in different groups,” comments biologist Rick Shine of the University of Sydney in Australia. Dagger-sharp frontal fangs allow cobras and vipers to prey on feisty mammals such as the large desert rat. Garter snakes, corn snakes and others that hunt less volatile creatures do just fine with fangs in the back of their mouth.

What confused biologists, however, was learning that the front-fanged snakes don’t fall into a neat group. In the snake tree of life, rear-fanged snakes are scattered on evolutionary branches in between the cobras and the more recently evolved vipers, which indicates that fangs evolved at least a couple of times on separate branches, leading to front-fanged snakes.

The assumption of multiple origins is problematic for evolutionary biologists, who prefer to find that complex structures like fangs — multi-part weapons consisting of a sharp tooth connected to a venom gland — don’t just come and go. If they did, fangs presumably would have popped up in other vertebrates.

By and large, they haven’t. (But a few vertebrates have gone for chemical warfare- see pg 8- Ed).

The distinction between front-fanged snakes and rear-fanged snakes goes back centuries, Shine says. Most studies focus on fully formed fangs. The new study by Vonk is the first in decades to compare how front and back fangs develop within snake embryos.

Cont’d on pg 4)

BAARS BOARD 2008
(www.baars.org/board.html)

President- Scott Alexander
(408) 823-3675
<charles.salexander@verizonbusiness.com>

Vice-president
Setiva Woodring
(408) 679-5672
<gobaars@yahoo.com>

Recording Secretary
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(831) 442-3100
<avelstud@earthlink.com>

Membership Secretary
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<kendrickwong@hotmail.com>

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<dclf_herps@yahoo.com>

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<gobaars@yahoo.com>

Members-at-Large
Erik Koessel
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Newsletter Editor
Jack DeRyke, (775) 267-3907
<jderyke@aol.com>

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BAARS CALENDAR- 1st half of of year 2008

May 1 BAARs Board Meeting- @ Scott & Caroline's home
May 2 Herp-Hike at JD Grand State Park, San Jose
May 22 Regular BAARs meeting at Cubberley Community Center, Palo Alto
Speaker: Dr Robert Norris on Venemous Snakebite Management

June 5 BAARs Board Meeting- @ TBD
June 26 Regular BAARs meeting at Cubberley Community Center, Palo Alto
Speaker: TBD

July 3 BAARs Board Meeting- @ TBD
July 24 Regular BAARs meeting at Cubberley Community Center, Palo Alto
Speaker: TBD

MAY ADOPTIONS

1 – Ball Python

Lots of Red Ear Sliders!

Congratulations to all who helped!

BAARS MEMBERS- in honor of Dr Norris speaking on Snakebite and venoms at the May meeting, this is the very first issue of Behind BAARS that features venemous reptiles as the theme (some of which was reprised from the Long Island Reptile Club newsletter). While I don't advocate keeping these guys (they make nervous, often deadly pets that will ruin your wife's sleep), its quite possible to encounter them on nature walks. One should always know his adversary's habits!

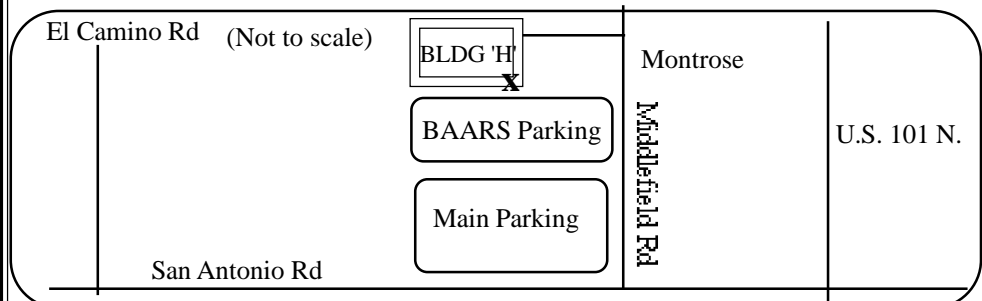
J DeRyke, Ed 09

General Meeting Information

Meetings are held at Cubberley Community Center
4000 Middlefield Rd, Bldg H-6, Palo Alto CA
Meetings are on the 4th Friday of each month, except for Nov and Dec.
Meeting starts promptly at 8PM; doors open @ 7:30 PM
Annual Meeting & Holiday Party is held on the 2nd Friday of December

Meeting Guidelines

All people attending meetings must be quietly seated except for the social break in the middle. This is to ensure the speedy completion of the business portion of the meeting, as well as in consideration of our speaker(s). ALL animals brought to the meeting must be in suitable containers, including a source of heat if req'd
All animals must be kept in their containers during the business portion of the meeting. Aggressive animals, sick or in-shed animals or delicate animals, should not be brought to the meeting, both for their sake and that of the humans attending.



BAARS PRESIDENT'S REPORT MAY 09

Hey BAARS members and Friends -

I wish to extend a big thanks and a hearty congratulations to Jan Robb (along with her son, Ian), who spoke at our April general meeting on "Herps of the World". For those of you who missed it, she presented a herp slide show which must have had 300+ slides, judging by how fast they whizzed by. She often had 2-4 slides of the same herp or setting, so she easily had 2-4 times as many slides as most of our speakers.

This month (May), we'll be featuring Dr. Bob Norris, who will be speaking on North American venomous snake bites and their treatment. Dr. Norris is an expert in administering field medicine, as well as the treatment of venomous bites in general and the treatment of snake bites in particular.

BAARS has a trip to Pepperwood Ranch planned on May 30th and May 31st. This is a private reserve in Santa Rosa, and is usually closed to the public. We're fortunate enough to have the privilege of staying there the night of the May 30th, and will have a number of hikes on both Saturday and Sunday.

There is some pretty amazing scenery at Pepperwood, and a lot of herps, including Pacific Chorus frogs, Bullfrogs, Western pond turtles, Red-legged frogs, Fence lizards, Alligator lizards and a variety of snakes. No collecting allowed, though.

Check our website for additional information about upcoming reptile shows. Hope to see you guys and gals soon at a meeting or a show.

Sincerely,
Scott Alexander
BAARS President, 2009

DO SNAKEBITE KITS REALLY WORK?

By LAURA JOHANNES

Wilderness enthusiasts often carry snake-bite kits, which makers say can treat a wound until help arrives. They include suction devices and sometimes scalpels to open & drain the wound, which may do more harm than good.

The American Association of Poison Control Centers, a nonprofit trade group, logged 6,550 snake bites in '07, of which about half were poisonous — most commonly involving the pit viper family, including the rattlesnake. Since not everyone reports snake bites, the actual number of bites is significantly higher— thousands of bites overall, of which likely 7 to 8,000 a year are from venomous snakes (including dry0gites), according to estimates in scientific literature.

Pit viper venom can cause severe swelling, bruising pain at the bite site, internal bleeding and sometimes problems breathing. Snake bites, treated in a hospital by antivenom, are rarely fatal.

Snake-bite kits, which cost \$4 to \$15 and are sold in sporting-goods and camping stores, are intended to be used before antivenom can be administered. Kit contents vary, but often include a scalpel, a suction device and a constriction band to be tied around the limb to slow spread of the venom.

Doctors say the kits are, for the most part, based on outmoded ideas. The best thing to do is call 911 or get the patient to a hospital as soon as possible, says Lori Weichenthal, a wilderness-medicine expert at the University of San Francisco in Fresno.

If possible, Dr. Weichenthal adds, immobilize the bitten limb and keep it below the level of the heart — but more important, get to help fast, and never use the scalpel in snake kits, Weichenthal and others say, as it could damage the skin.

Some physicians say the constriction band may help, but make sure it is loose enough to slip in a finger. Cutting off circulation could damage a limb.

(Cont'd on pg 6)

(Fangs concluded from pg 1)

As snake embryos develop within eggs, their cells multiply and differentiate. Genes direct cells to take on different identities — an eye will form here, a tongue there. In snake “gums,” a gene called “sonic hedgehog” — from its similarity to the popular computer-game creature — lays out the toothy part of the body plan.

Vonk and his collaborators collected hundreds of snake eggs, and slowly began the arduous process of tracking down where sonic hedgehog was being expressed in the mouths of the embryos. Finding snake nests in the wild is incredibly hard, Vonk says. (As any field herper could attest, by the way.)

So the group sought out eggs from hobbyists around the world who raise snakes in captivity. After examining multiple embryos from eight snake species — some with fangs in front, some with fangs in back, some without fangs — Vonk’s team discovered that the initial plans for fang formation consistently began at the back of the mouth, even in front-fanged snakes.

“When you get a finding like that, where the fangs in all kinds of adults come from the same place in the embryo ... it supports the idea that there’s an evolutionarily common origin for the fang and that it hasn’t evolved totally independently,” explains Michael K. Richardson of Leiden University.

An unknown but critical event millions of years ago set the stage for fangs to form, the researchers suggest. Tooth-forming tissue at the back part of the jaw became uncoupled from the front part, so that the back area was free to change while the front part still grew teeth with which to grab prey. Thus the primitive snake could survive while the back part of the mouth was still ‘under construction’.

“Nature took the easiest path,” says Richardson, “and the easiest path is not to evolve a whole new structure but to just move this wonderful biological weapon around in the skull to suit different lifestyles.”

Cobra fangs are short and rather stationary compared with rattlesnake fangs, which lie flat against the roof of their mouths and swing downward like a bicycle kick-stand, to pierce prey.

Stiletto snake fangs, on the other hand, snap out of their mouths horizontally, allowing these animals to stab sideways in a defensive move... as many herpetologists have found to their dismay. Luckily, Stiletto snake venom is rather mild, usually only inducing a numbness that soon passes.

Yet all those frontal-type fangs grew from tissue at the *back* of the mouth in some early snake ancestor. Embryonic fang development is a relic of that early process, says Vonk. Early snakes with a mouth more like today’s fangless boa constrictors diverged from lizards some 100 million years ago, he said.

Fossils of fanged snakes date back about 24 million years. The researchers found that boas bear just one section of dental tissue, while the fanged snakes all have two. So, they propose, in those millions of years between the fangless and fanged snakes, dental tissue split and in doing so, allowed fangs to form. In turn, fanged snakes feasted, flourished and diversified.

Of the 2,700 species of snakes currently known to exist, 2,300 are in the ‘fang-bearing’ group. This of course includes the enormous group known as Colubrids, most of which are non-venomous.

Dr. Brian Fry of Australia disagrees, writing that most Colubrid snakes and a few Monitor lizards are in fact technically venomous, but either the venom is extremely weak, very specialized toward a particular prey, or the amount delivered is so miniscule as to be harmless to humans.

Hognose snakes are the most well-known of the technically-venomous-but-in-fact-harmless rear-fanged Colubrids. Their ‘venom’ is only strong enough to relax small mice and toads, and is unnoticed by larger animals.

RATSLAKE UPDATES

Spring is here! Sure sign: I've seen both robins and horned lizards in our yard (the robins are later). And what is more characteristic of Spring than unbounded optimism. It's a new year, stuff is blooming explosively, weather has calmed down (a little)... so what do herpers do? Of course- they acquire a new reptile!

2008 was a pretty good year for us as far as losing herps (usually, one of two ways for us: unexplained deaths, or old age). Over the winter, we lost none- a rarity. But we did lose a Corn snake during the middle part of the year, and our venerable Gray-Band kingsnake passed on in the Fall. So combined with the optimism expressed in paragraph one, we have empty cages!

The empty-cage syndrome is well known to prey on the mind of any herper. So since our income-tax refund arrived along with a repayment of an old debt, I find myself with excess funds as well. I began looking for a new snake. Since it's too early for herp shows- even given my self-imposed driving radius of 500 miles- my search started on the Internet.

And in the 'Old-World Rat Snakes' section of Kingsnake.com, I spotted an ad for captive-bred baby Moelendorf's Ratsnakes! Further tempting me, they were actually affordable (well.... sort of). So I took a deep breath, contacted the hobby-breeder, sent of a check, got an empty cage all cleaned and ready, and began waiting.

The Moelendorf ratsnake (*Elaphe moelendorffii*) is a highly colored ratsnake of large size (over 6 ft). of the asian-rat variety typified by the Taiwan beauty, the Diadem ratsnake and others from the Far East: an elongated head, slim body, semi-nervous habits and a marked reluctance to eat U.S sourced rodents. I've been down that road before with wild-caught Moelendorf's, and after the last episode, I swore I'd never again buy a wild-caught exotic.

For the newbies and those old-timers with short memories, I bought a half-grown, wild-caught Moelendorfs, and spent 6 long months trying to induce him to eat, without success.

He would drink but not feed. So, fearing for his demise from starvation, I reluctantly began force-feeding him.... which continued for another 18 months! He finally passed on after 26 months of captivity, without ever eating on his own, and it so soured me of wild-caught exotics that I vowed not to get involved again.

Moelendorff's are infamous for this behavior; many renowned reptile breeders across the country have had much the same story with this breed, but I thought I could prevail. Wrong; end of story.... But this 6-month-old *captive bred* animal will hopefully be different. We'll see how things go.

In other 'exotic' news, y'all may remember that we also have a 12-year-old Diadem rat snake (*Spalerosophis diadema atriceps*). This subspecies goes thru an ontogenetic color change at about 2 yrs of age. Baby *atricepts* look like tan U.S. Gopher snakes, but adults of this subspecies shift to a gorgeous brick-red ground color with gloss black heads and a few scattered spots along the heavy body. Ours is a stunning animal at over 5-1/2 feet long and nearly 3 lbs.

A closely related subspecies, *Spalerosophis diadema dolichospia* from North Africa shifts to a yellow ground color with the same gloss black head and spots. Two years ago, I managed to find a breeder of this type. Well, my example has finally begun his color change. The busy gopher-snake pattern has all but disappeared and his color is now pale yellow with deep brown spots. Hopefully, the yellow will intensify as he gets older.

Both are handleable- which is good since all *Spalerosophis* are reputed to be rear-fanged (weak venom), and get large enough to cause damage even without venom, which reportedly causes numbness and allergic reactions in sensitive humans. Our two have never bitten anyone, so I cannot verify this, though. But he's attractive, colorful and handleable, and to us, thats enough!

Efficacy of the suction devices are still under debate. One of the most popular devices, the Sawyer Extractor, (Sawyer Products Inc, Safety Harbor, Fla) consists of a syringe-shaped chamber with a plunger that creates a vacuum. The company suggests leaving it on a puncture 10 to 15 minutes to extract the venom.

However, a study in pigs and one using radioactively labeled simulated venom injected into the thighs of eight human volunteers found the Sawyer Extractor ineffective. "It removes just a minute quantity of venom," says pig-study author Sean P. Bush, a professor of emergency medicine at California's Loma Linda University School of Medicine. The human study, published in 2004 by researchers at the University of California in Fresno, found that the device removed no more than 1% to 2% of mock-venom from the leg.

Sawyer Products owner Kurt Avery says he believes the studies show only that the product doesn't work well in large muscle areas such as thighs and calves. Based on the results, the company changed its label 2 years ago to warn that the pump is "not as effective" at removing venom from large muscle areas. Avery maintains the product is effective when the bite is under the skin in hands, feet or other nonmuscle areas.

That argument doesn't sound plausible to Stanford's Dr. Auerbach, who had advocated use of the Sawyer pump in his '03 book "Medicine for the Outdoors" and is listed on Sawyer's Web site as supporting the product, says the new edition of his book, expected out next month from Elsevier Inc., will recommend against its use based on newer research.

Other doctors say the scientific evidence against the Sawyer pump is inconclusive. "The jury is still out" on the pump, says Robert S. Hoffman, director of the New York City Poison Control Center., who carries one in his backpack when he goes hiking in venomous snake territory.

BAARS NOTES

Classified ads

Classified ads are free for members (\$5/mo for non-members)

Display ad rates:

\$7.00 Business card size

\$11.50 1/6 page

\$22.50 1/3 page

\$35.00 1/2 page insert

\$70.00 full pg insert

All display ads should be camera-ready. Electronic submissions should be saved as postscript format (.pdf) for best image quality.

Live Food Items

Feeder animals may be available at the regular meetings. It's recommended that you bring your own containers for transport home.

Frozen Rodents are sometimes available through BAARS as a Group Buy. Details will be available at the meetings.

MEMBERSHIP FORM

- Individual/Family \$25/yr Contributing \$50/yr
 Sustaining \$35/yr Patron \$100/yr
 Institutional (schools, libraries, non-profit org, service org)
 NEW MEMBER RENEWAL/CHANGE OF ADDRESS

NAME: _____

ADDRESS: _____

PHONE NUMBER/AREA CODE: (_____) _____

CITY/STATE/ZIP CODE: _____

EMAIL ADDRESS: _____

HERPETOLOGICAL INTERESTS _____

For more info, visit our website: <http://www.baars.org/index.html>

To join BAARS, mail this application, with your check to:

BAARS MEMBERSHIP SECRETARY

c/o

Palo Alto Jr Museum
1451 Middlefield Rd
Palo Alto, CA
94301-3351



ADOPTIONS & FOR-SALE

REF# 90404 – 4 Ball Pythons

Species: Multiple Ball Pythons

Gender(s): Unknown

Size: ~30 in.

Age: Various

Weight: Various

Health Status: Very good

Disposition: Gentle

Current Diet: Live Mice

Vet visits: N/A

Accessories (Cage, Food): None

Special Needs: None

Do You Have a Photograph?: Yes

Reason for Adoption Request: Currently in foster care in San Jose

Level of Urgency: Moderate

Locations San Jose & Santa Clara, CA

REF #90103 – Ball Python

Ball Python, 44" long, 6 yrs old

Health status: Good, active and a good weight.

Disposition: Very docile, enjoys being handled

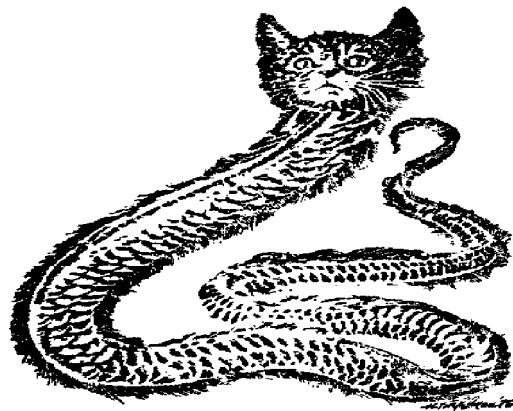
Current Diet: Small live rat every 10-14 days (won't eat frozen/thawed)

Accessories (Cage, Food): 48" long tank, cage furniture, under-tank heater, and light & fixture

Reason for Adoption Request: Lifestyle changes

Level of Urgency: Moderate

Location (City): Fostered in San Jose. Call Dianne or Colin Flagg



SNAKAT, FROM NOVEL, '1 MILLION A.D.' where radical 'designer pets' were common.

The animal adoptions listed herein are for the prospective benefit of BAARS club members as adoptees.

No guarantees as to the health, suitability or legality of the adopted animals as pets, is either expressed nor implied.



Venom Isn't Just For Snakes!

Dr. Brian Fry of the U. of Melbourne, also known as 'The Venom Doc', has spent most of his professional life researching venoms and their effects. And he's found that, with a strict definition of 'venom' being a chemical that's secreted by an animal for the purpose of defense or hunting, includes a few that you likely never considered as 'chemically dangerous'. Among vertebrates, Puffer and Lion fish have killed many humans.

But the greatest number of venomous vertebrate species are reptilian, and recent research indicates that the Gila Monster is no longer the only venomous lizard. The Komodo Dragon seems to have a toxin in its saliva as well as known populations of infectious bacteria, and Dr. Fry has found the same Cobra-like toxins in the mouths of some of the larger related Far-East Monitors and Goannas.

Also in the vertebrate world, there's the whole family of Poison Dart frogs and the Cane Toad that sweat toxic alkaloids from their skin. Among mammals, the proto-simian Slow Loris (*Nycticebus concang*) does the same thing, except the Loris allows its toxic sweat to drain into its open mouth, then delivers it to an attacker with a powerful bite. The toxin is virulent enough for the Loris to kill small predatory dogs.

Likewise, the male Platypus from Australia is known to have venomous spurs on its back legs, used during breeding season to incapacitate other males, and for defense. Platypus venom has also killed small dogs. In North America, the tiny Short-tailed Shrew (2 species) has long been known to be mildly venomous. A bite to its chosen prey- large insects- paralyzes them for up to 4 days. The Shrew seems to use the incapacitated insects as a non-spoiling food source. A related shrew in Eurasia does the same with its venom.

Dr. Fry has even found a species of bird- the Pitahui (*Pitahui dichroas*) from the Far East that has toxins very similar to those of the Poison Dart frogs, except they don't come from ingested poisonous insects but from the bird itself. The Pitahui preens the alkaloids over its feathers and skin, which become quite toxic to predators who quickly learn to leave the bad-tasting Pitahui alone!

THE BAY AREA AMPHIBIAN AND REPTILE SOCIETY

PALO ALTO JR MUSEUM, 1451 MIDDLEFIELD ROAD

PALO ALTO, CA 94301



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