Enviroscope November 2006

KEEPING FIELD GUIDES ON TARGET

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## What Is It?

## October's crossword solution

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## Are you one of the 50000?

Researcher William Leo Smith of the American Museum of Natural History in New York City has recently documented a complete list of more than 1200 venomous fish. In his words, "*the results of this research were quite surprising*". The list includes lionfishes, catfishes, scorpionfishes, weaverfishes, toadfishes, surgeonfishes, scats, jacks, rabbitfishes, stargazers, and stonefishes. As a result of our curiosity/stupidity and determination to catch and eat fish, more than 50,000 people are poisoned by fish "stings/bites" every year worldwide. Symptoms range from blisters to death.

The importance of the study lies in the development of new drugs. Venom proteins can be used to develop drugs to treat a range of ailments from allergies to pain and even cancer. While many creatures have been tapped for drug development, fish remain a relatively untapped resource. Six different treatments for stroke or cancer developed from snake venom are nearing review by the FDA (Food and Drug Administration) and scorpion venom has recently been used in a brain cancer treatment.

**"Man and man's earth are unexhausted and undiscovered. Wake and listen! Verily, the earth shall yet be a source of recovery. Remain faithful to the earth, with the power of your virtue. Let your gift-giving love and your knowledge serve the meaning of the earth" - Friedrich Nietzche**

## Maggot juice band-aids

Medical practitioners have known for centuries that live maggots are one of the best ways of cleaning up dead tissues and healing intractable flesh wounds. The problem comes with getting patients to volunteer having their wounds infested with creepy crawlies normally associated with stinking rotting meat. To overcome this "yuk" factor, scientists have harvested and purified the maggot secretions and incorporated them in new wound dressings. So far the results are encouraging. Wounds treated with the new dressings healed much faster than those treated by normal means. These tests were conducted on cultured mouse tissues in Petri dishes; the time for live testing is approaching. Any volunteers?

## First accurate shark finning figures horrify

Demand for shark fin is growing as a result of the increase in middle class wealth in China. The newly rich are apparently eating the soup to simply show that they can afford it, with the result that sharks are now being killed at a rate of between 38 and 100 million per year, or between 1,2 and 3 sharks every second!

For the uninitiated, shark-finning is the practise of catching sharks on a long line and then cutting the fins from the live animal, which is then tossed back into the water to sink to the bottom and drown. The fins are dried and then used to make a tasteless soup. The fin consists entirely of cartilage and has little nutritive value.

These terrible figures have been obtained by researchers using new mathematical estimating methods - which they were forced to resort to this because the shark fin "industry" is very secretive and closely guarded. Accurate figures are impossible to get directly from source. To make matters worse, the commercial fishing industry regards sharks as a low value by-catch and do not keep records of the numbers that they kill annually.

Researchers using the new methods concluded that from 1996 to 2000 26 to 73 million sharks were traded yearly. The annual median for the period was 38 million.

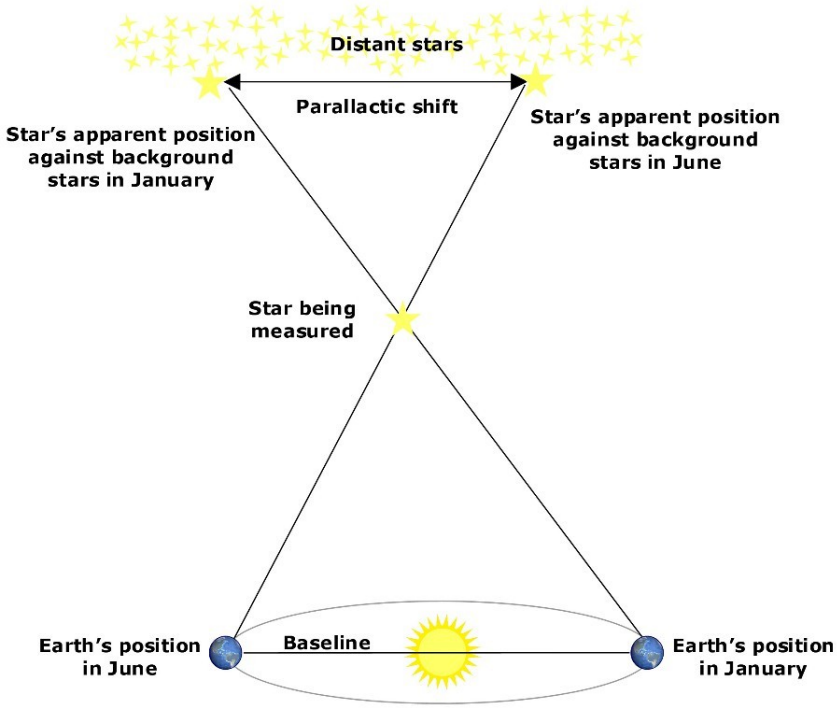
CITES now lists only three shark species as endangered — basking shark, whale shark and white shark. Maybe its time all sharks received this protection - at least on paper. The real difficulty comes in trying to stop demand for the product and trying to police and stop the gangs responsible for this rape.

**"I saw all the people hustling early in the morning to go into the factories and the stores and the office buildings, to do their job, to get their check. But ultimately it's not office buildings or jobs that give us our checks. It's the soil. The soil is what gives us the real income that supports us all." - Ed Begley, Jr.**

## How do astronomers measure the distance to a star?

Measuring the distance to the stars is difficult because we cannot physically travel to them, measuring the distance as we go. Instead, astronomers use indirect methods which rely on a physical factor called parallax. These measurements take advantage of the fact that as the earth orbits around the sun the position of close stars appears to shift in relation to its background.

To see this practically, hold a finger at the tip of your nose. Look at your finger with first your right eye and then your left. Your finger appears to move because your eyes are not at exactly the same place, so each eye views the finger from a different angle. If you now hold your finger at arm's length and repeat the experiment, your finger will still appear to shift, but not as much as before. The same thing happens to stars. The closer stars appear to shift more than the farther stars. **(NB: The "fixed" background stars are not really fixed; they are just so far away that we cannot distinguish their apparent shift).** The apparent shift of a star is called its parallax.




Parallax is simply the apparent change in the position of an object due to a change in the location of the observer. In order to measure the parallax of stars which are very far away, we must use the largest baseline possible. (The baseline is the distance between the two points where we take the measurements. For the experiment above with your finger, the baseline is the distance between your eyes.) A larger baseline results in a larger shift, which means that we can measure

the parallax of stars which are farther away. The largest baseline we can use for ground based observations is the diameter of the Earth's orbit. Using the Earth's orbit, we make one measurement of the position of a star in, say, June, and the second measurement in December (6 months later). The smallest shift we can reliably measure from the Earth is 0.02 seconds of arc, which corresponds to a distance of about 50 parsecs (163 light years), so stars farther away than this do not appear to move and constitute the "fixed" background stars we use in the measurement. Once we have measured the parallax angle in seconds of arc, we can use the simple parallax formula to find the distance to the star.

$d = \frac{1}{p}$ [Where $d$ = distance to star in Parsecs and $p$= parallax angle of star in arcseconds.]

There is no direct method currently available to measure the distance to stars farther than 50 parsecs from Earth, so astronomers instead use brightness measurements of Cepheid variable stars. These stars change in brightness over time, which allows astronomers to figure out their true brightness. By knowing the ***actual*** brightness and comparing it to the ***apparent*** brightness seen from Earth (that is, by looking at how dim the star has become once its light reaches Earth), they can determine the distance to the star. This method was discovered by American astronomer Henrietta Leavitt in 1912 and used in the early part of the century to find distances to many globular clusters.

## Whales found to speak in dialects

A recent study shows that blue whales off the Pacific Northwest sound different to blue whales in the western Pacific Ocean, and these sound different than those living off Antarctica. And they all sound different to the blue whales living near Chile.

*"The whales in the eastern Pacific have very low-pitched pulsed sounds, followed by a tone,"* said David Mellinger of Oregon State University. *"Other populations use different combinations of pulses, tones, and pitches."*

Using newly developed underwater microphones called autonomous hydrophones, Mellinger and his colleagues recorded the cacophonous symphony of whale clicks, pulses, and calls throughout the Pacific Ocean.

Researchers don't know why whales of the same species sound different in different areas. "*The difference is really striking, but we don't know if it is tied to genetics, or some other reason*," Mellinger said. "*We don't know if they are part of a common 'language' that different populations of whales use to communicate with each other, or if they come from a confused juvenile who hasn't completely learned the complexities of communicating*."

## Snakes don't need specs

It is well known that pit vipers and boid snakes use heat receptors to identify and capture warm blooded prey. What is not so well known is how they do this. Researchers have found that signals from heat receptive pits are "hard wired" directly to the visual cortex of the brain so that the snake reacts not only to a stimulus, but is able to physically see an infrared image.

Heat receptors work in much the same way as a pinhole camera. In these cameras, light enters a tiny aperture in the "lens" and is then diffracted into a tiny point which makes up the focussed image. The problem with this system is that such a small hole would never allow sufficient infrared waves (long wavelength) to enter and stimulate the sensory membrane of the heat pit. The snakes therefore have to use a much larger hole to gather sufficient infrared, and then process the signals in their brains into a useable image. Apparently, a network of neurons in the brain acts like corrective lenses, bringing the blurred image into focus. Each signal from the infrared receptor causes a neuron to fire, the final focussed image being made up of a composite of all the fired neurons.

## I always thought drongos were clever

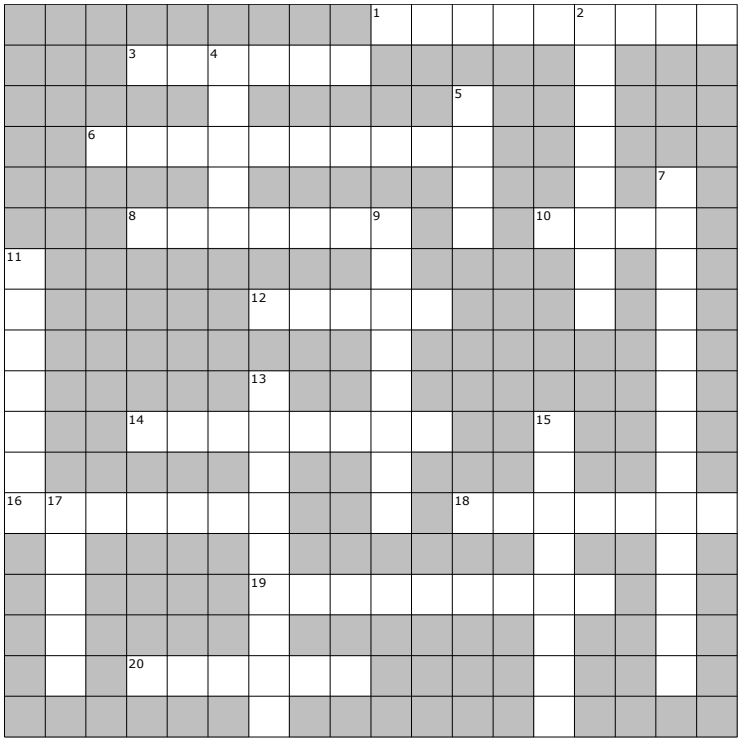
One of the most intriguing and mysterious aspects of birdsong is vocal mimicry. Whatever the reason for the mimicry, there appears to be little or no relationship between what the bird is doing at the time and which species it is imitating. A good example of this is a Natal robin (I still prefer the old names) imitating a lawn sprinkler from somewhere deep within your flowerbed. That was until now. Researcher Eben Goodale made an amazing discovery while documenting the behaviour of racket tailed drongos in mixed species flocks while working on his PhD in Sri Lanka. What he discovered is that the drongos have learned to use the alarm calls of other species in the same context that those species use them. This is the first time that communication across species boundaries has ever been recorded.

"*I still remember vividly the moment that I first observed this behaviour*," he says. "*I was following through the rainforest a mixed-species flock of birds. Mixed-species flocks in this rainforest are large and noisy, averaging 12 species and nearly 40 individuals. From the back of the flock, one bird, a greater racket-tailed drongo, swooped down and approached me to within three meters at my head height. The drongo was clearly mobbing me - a behaviour that birds use to notify other individuals of the presence of a stationary predator*."

The familiar scene quickly changed, according to Goodale. "*The drongo did an extraordinary thing: it began to mimic the mobbing-specific note types of other species. It kept rotating through the mobbing notes of other species, in addition to its own notes. I wouldn't have understood what was happening if I hadn't just completed a study on the alarm-associated calls of all the species in the flock system."*

Further study by Goodale revealed that drongos' repertoire is varied. They imitate other species' notes in the same contexts as other birds and also mimic the calls of predators, which they use in alarm situations.

## Crossword – Animal Names



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### Across

1. Emblem of the Sabi Sand Wildtuin (9)
3. Its Afrikaans name is "*Tierboskat*" (6)

6. The German name for this member of the Big Five is "*breitmaul-nashorn*" (10)
8. South Africa's national fish (7)
10. Antelope emblem of SANParks (4)
12. Antelope for which Mala Mala private game reserve is named (5)
14. German word for this bird is "*madenhacker*". (8)
16. Its Zulu name means "taller than the trees" (7)
18. French name for it is "*Geupard*" (7)
19. Zulu word for wild dogs (9)
20. Tswana name for a cheetah (6)

## Down

2. Its Tsonga name is "*Mbavala*" (8)
4. Another common name for the honey badger (5)
5. Its Afrikaans name is "*bastergemsbok*" (4)
7. Afrikaans name for a genet (13)
9. One of the German names for hippopotamus (8)
11. Its Italian name is "*phacochero*" (7)
13. Afrikaans name for a pangolin (9)
15. Its seTswana name is "*Tlou*" (8)
17. Zulu word for a leopard (5)

## What is it - Answer

The frog pictured is currently called the painted reed frog (*Hyperolius marmoratus*). This is one of the most variable species of frogs in the word and comes in such a wide range of colours, patterns and stripes that frog fundis have nightmares trying to classify it. Over the years it has had over forty different zoological specific names and a myriad subspecific names. In English it has been called the painted reed frog, marbled reed frog, variegated rush frog, marbled rush frog, aposematic reed frog and at least another five or six different names. (You thought the new bird names were confusing – no?)

The painted reed frog is common in South Africa and is most often identified by its high pitched piping whistle which is given from among reeds and other aquatic vegetation. It feeds largely on mosquitoes which are captured soon after they emerge from their pupae. A valuable frog indeed!

**Another common colouration of the painted reed frog**

**Photo Credit: Stefan Winterboer**